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To determine the effectiveness of programed materials and teaching machines in teaching spelling to third and fourth graders, a research project was designed covering an entire year and using classes in three schools as subjects. Classes at the experimental school used TMI-Grolier's "Modern English Series: Spelling" and the Min/Max II teaching machine as their spelling instruction for the year. Classes at one control school studied the word list for the programed course by conventionalmethods. Classes at the other control school followed the traditional, conventional course for the year. A descriptive analysis of the program was made from teacher and student evaluations. An analysis of variance was made for each of two possible variables considered, intelligence scores and spelling achievement, and for each of the five criteria instruments used in the study. Tests of statistical significance were made for total groups, by grade level, and by ability level to test the gain made by each group. It was concluded that there was no evidence to support one form of instruction over the other, that classes using teaching machines spent too much time with mechanical difficulties, that low ability groups benefited most from programed methods, and that the use of programed materials in textbook rather than teaching machine format should be investigated for elementary school use. (MT)

TEACHING SPELLING TO THIRD AND FOURTH GRADE PUPILS WITH THE USE OF PROGRAMMED MATERIALS AND

SIOUX FALLS PUBLIC SCHOOLS

E. W. Skarda, Superintendent

TEACHING SPELLING TO THIRD AND FOURTH GRADE PUPILS WITH THE USE OF PROGRAMMED MATERIALS AND TEACHING MACHINES

May, 1963

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Administrative Assistant to Superintendent

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CHAPTER I

INTRODUCTION

In the spring of 1962, a study was designed to compare methods of teaching spelling to third and fourth grade pupils during the 1962-1963 school year. One of the methods considered and used consisted of the use of programmed materials and teaching machines.

Because of the increased use of educational innovations throughout the country and because of many successful experiences resulting from their use, the local board of education and school administration have initiated a research program in the local school system so that such innovations can be tested for local use. After several discussions among the administrative staff members and faculty, it was suggested that a research program be designed through which the use of programmed materials and teaching machines could be appraised. It was decided that one phase of this program would consist of the use of programmed materials and teaching machines in the teaching of spelling to third and fourth grade pupils.

I. NEED FOR THE STUDY

Local school authorities wished to test the use of programmed materials and teaching machines in the teaching of spelling to third and

fourth grade pupils. A limited number of similar studies conducted in various schools throughout the nation are available.

However, it was felt that the number of such studies was not sufficient. Also, it was felt that a local study should be made to determine which results would apply to the local system. Programmed materials and teaching machines are relatively expensive and it is necessary to determine their usefulness, feasibility, and effectiveness before they are purchased in large quantities.

II. STATEMENT OF THE PROBLEM

This study is designed to compare two methods of teaching spelling: by the conventional method and with the use of programmed materials and teaching machines. It is also designed to provide descriptive analyses of the use of programmed materials and teaching machines. More specifically, the objectives of the study were:

1. To compare standardized spelling test results between control and experimental groups.
2. To compare the control and experimental groups on the results of tests based on a word list selected from the words in the programmed materials.
3. To compare the control and experimental groups on the results of tests used to measure transfer of spelling skills.
4. To compare the control and experimental groups on the results of tests of rules of spelling.

5. To compare attitude-toward-school inventory results between control and experimental groups.

6. To present descriptive analyses of the use of programmed materials and teaching machines.

7. To compare time needed to complete the program.

III. PROCEDURE FOR THE STUDY

The study was designed to include the following procedures:

Sample

Three elementary schools (two for control and one for experimental) were chosen at random. In the two control schools the two sections each of third and fourth grade students constitute the entire third and fourth grade population in these schools. In the experimental school two sections each of third and fourth grade students were selected on the basis of the most experienced teachers.

Classroom

The experimental group consisted of two sections each of third and fourth grade pupils. Their classroom experiences in spelling were to consist of using a programmed spelling course with a teaching machine for 20 minutes per day.

There were two control groups, Control Group A and Control Group B, each consisting of two sections each of third and fourth grade pupils. The two control groups and one experimental group each came from different elementary schools. Control Group A was to devote 20 minutes per day to

spelling, with the word list from the programmed spelling course being used as the basis for instruction. However, students in Control Group A were taught the spelling word list without the use of programmed materials or teaching machines. They were instructed by conventional methods.

Control Group B was to devote 20 minutes per day to spelling, using the conventional spelling program for the appropriate grade level. They did not use programmed materials, teaching machines, nor the word list based on the programmed spelling course.

Each individual in the experimental group continued to use the programmed course and teaching machine until he had completed the course. Each group maintained detailed records of time.

Testing

All three groups were administered the following tests at the beginning of the experiment: intelligence, two standardized spelling tests, a spelling test based on selected words from the program, a spelling test based on selected words to measure transfer of spelling skills, a test on rules of spelling, and an attitude-toward-school inventory. The intelligence test and one spelling achievement test were used only once. However, the other five instruments were used in a pre- and post-testing situation, that is, at the beginning of the experiment and at the end of the experiment. Students using the teaching machines were tested individually as they finished the program. Those not finishing the program were tested toward the end of the school year, the week of May 13. Students in both control groups were tested when Control Group A completed the word list, the week of April 15.

Each of the four teachers in the experimental group maintained a descriptive anecdotal record. An attempt was made to record routine as well as unusual happenings. Evaluation sheets were completed by each teacher in the experimental group at the end of the school year. Each student in the experimental group maintained time records and also reported reactions and attitude on an evaluation sheet at the end of the year.

A reliability coefficient of 0.80 has been obtained on a test consisting of 40 words selected from the programmed course. The Kuder-Richardson formula was used to obtain this coefficient with a group of students in the Sioux Falls Public Schools (see Appendix A).

Following is a list of the evaluation instruments used in this research project:

1. Pre and Post Tests
   - A. National Achievement Tests in Spelling (Acorn Publishing Company)
   - B. Test on Word List from Programmed Spelling Course (40 selected words)
   - C. Test on Word List to Measure Transfer of Spelling Skills (Designed by local curriculum department)
   - D. Test on Rules of Spelling (from Programmed Materials course)
   - E. How I Like School (Attitude-Toward-School Inventory, University of Minnesota)
2. Pre Tests Only
   - A. Large Thorndike Intelligence Test (appropriate form of test for each grade level

3. Others

A. Teachers' Anecdotal Records

B. Teachers' Evaluation Sheets

C. Students' Time Logs and Commentary

D. Students' Evaluation Sheets

(See Appendices B through K.)

Descriptive Analyses

These analyses consist of a descriptive account of the experiment, describing procedures, and reporting routine as well as unusual happenings. An attempt is made to report the reactions, feelings, and attitudes of teachers and students to programmed materials and teaching machines. What type of student did the machine seem to motivate? Which type did it fail to motivate? What significant changes in student behavior might be due to the experiment? Anecdotal records and evaluation sheets of students and teachers support this phase of the investigation. Also, time records maintained by the students are analyzed in this phase of the report.

Statistical Analyses

Intelligence tests and the spelling subtest of the Iowa Tests of Basic Skills were administered to all three groups to determine whether these variables needed to be controlled statistically. Tests of statistical significance were made on the pre- and post-testing on the four spelling tests and attitude-toward-school inventory. Further tests of statistical significance were made, based on three levels of ability as determined by the intelligence tests.

IV. ORGANIZATION OF THE REMAINDER OF THE STUDY

The remainder of this report will contain a review of the related literature on the teaching of spelling through the use of programmed materials and teaching machines, a descriptive report of the methods and procedures used in the three groups, an analysis of teachers' anecdotal records and evaluations, an analysis of students' reports and evaluations, statistical analysis of data, and conclusion.

CHAPTER II

REVIEW OF RELATED LITERATURE

The field of programmed instruction and teaching machines or auto-instructional devices is a developing field still in its infancy. Changes are occurring almost daily. It is very difficult, for example, to maintain current information relative to new programs and new types of machines available. The number of research studies in this area is increasing rapidly also.

An NEA Journal contained a glossary relative to programmed instruction. It defined:

GLOSSARY

Auto-instruction (self-instruction). A comprehensive term denoting an instructional process that usually involves carefully planned materials and devices designed to produce learning without necessarily requiring additional human instructional assistance.

Program. Subject matter arranged in a carefully planned series of sequential items and involving (a) controlled presentation of material, (b) active response of learner, (c) use of cues (prompts) to elicit correct responses, (d) immediate confirmation of success or failure (feedback), and (e) reinforcement of correct responses in such a way as to enable individual learners to move ahead, independently and at their own pace, from familiar background to new and previously determined terminal behavior. Programs may be presented in books, in loose-leaf binders, in special machines, and in other ways.

Teaching machine (auto-instructional device). A mechanical device by which a program is displayed to a learner. It usually presents one frame (item) at a time, provides some method for the student to indicate an overt response, shows whether response is correct or not,

prevents cheating by student, maintains a record of student responses; enables use of nonverbal programs, that is, programs which are either totally or in part presented in audio and/or visual form.[1]

A special brochure prepared by the National Education Association contained the following pertinent information:

WHAT IS A TEACHING MACHINE?

Various types of instructional equipment which the individual student uses at his own rate of learning are popularly known as teaching machines, although authorities in the field prefer the term auto-instructional devices.

They may be simple or complicated, toy-like or computer-like, inexpensive or costly, but all teaching machines have certain characteristics that distinguish them from more traditional audiovisual equipment.

..They are designed for the individual student (one machine and one student) rather than for mass instruction of an entire class at one time.

..The machines require active response from the student who must manipulate them in some manner to indicate his responses to questions or problems they present.

..Teaching machines tell the student immediately whether his answer is right or wrong, providing reinforcement, an extremely important aspect of the learning process.

..Teaching machines present a certain organized program of material that may be tackled by the student at his own rate of learning.

Most teaching machines are cheatproof and do not allow the student to see the correct answer to a question or problem until he has recorded his own. Some give only the correct answer; others explain why a student's answer was right or wrong. Most will not allow the student to proceed to complex problems until he has correctly solved the simpler ones.

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[1]National Education Association, Teaching Machines and Programed Learning, A Glossary Prepared by the Staff of the NEA Journal (Washington: National Education Association, 1961), p. 15.

WHAT ARE PROGRAMMED TEXTBOOKS?

Closely related to teaching machines are programed textbooks which look like any textbook externally, but which are quite different in make-up. The programed text presents in proper sequence the separate steps, or questions, that make up the program. Answers to these questions appear in the book on subsequent pages.

Although the programmed text has much in common with the machine, it neither prevents the student from looking at the answer prior to answering the question nor controls other aspects of student behavior --aspects which can be prevented by machines or which machines can take into account. According to some studies this type of "cheating" appears to have little effect on learning, especially a. the more advanced educational levels.

ARE TEACHING MACHINES SOMETHING NEW?

Not exactly. Although they have been in general use in public elementary and secondary schools for only four or five years, teaching machines have been used in colleges much longer, and the armed forces have been doing much technical training by machine for at least 20 years. The first teaching machines, as we know them, were developed more than 40 years ago and have been used in limited numbers and for experimental purposes ever since.

WHY HAS THEIR DEVELOPMENT LAGGED?

Fear, cost, and lack of adequate programs are the main reasons that teaching machines did not come into popular use sooner. A few teachers have feared for their jobs, and some parents have feared that their children would not be treated as individuals where teaching machines were used. Costs of machines and programs have been greater than many districts have wanted to pay, especially when they suspected that, by waiting, more advanced materials might be put on the market at lower prices. Most important has been the shortage of programs for general use in the schools. However, much work has now been done on programming instructional material for most elementary- and secondary-school subjects, and these programs are now ready for wide experimental use in the schools.

IS IT TRUE THAT TEACHING MACHINES MAY REPLACE THE TEACHER?

No, definitely not! At the turn of the century, Thomas Edison predicted his motion-picture projector would do away with the need for teachers. Earlier, similar sentiments were expressed about the printed book. But like automatic washing machines and housewives, teaching machines and teachers have different purposes.

Machines can instruct and tutor and thereby help a teacher give students information and drill on an individual basis. The teacher is thus freed from much routine work and has more time to help students learn, individually and collectively. Though his role may change somewhat as more and more technological devices find acceptance in the classroom, the teacher remains the central figure in the instructional program.

WILL TEACHING MACHINES REPLACE TEXTBOOKS?

They will not replace textbooks, but undoubtedly they will have a considerable effect upon them.

However, not all material can or should be programed. The good teacher will add the teaching machine to her storehouse of instructional devices. It will supplement, not replace, textbooks and the other time-tested audio-visual aids at the teacher's disposal.

WHO CAN LEARN WITH TEACHING MACHINES?

Nearly all students can benefit from teaching machines. Significant success has been recorded both with those who require considerable individual attention at a slow pace and those who need freedom to proceed as rapidly as possible. Makeup problems are reduced and varied needs and interests are met more adequately when teaching machines are used.

Teaching machine programs are constructed to provide motivation to the curriculum. They force habits on students by the way the material is presented and by the constant demand for immediate, active student response. These habits seem to carry over into traditional learning experiences to the benefit of all types of learners.

HOW DOES LEARNING BY MACHINE COMPARE WITH LEARNING BY STANDARD TEACHING?

Research indicates that some students are able to learn much more and much faster when teaching machines are used to supplement standard classroom procedures. There is still some fear that teaching machines may destroy creativity, but research has not found this to be true. What machines can do for a student over a long period of time remains to be seen. Much more research is needed in this very promising area of education.

WHAT SUBJECTS CAN MACHINES TEACH?

In theory, any subject that can be verbalized can be programed. To date, the largest number of programs have been developed in arithmetic,

> mathematics, and the sciences, although a programed course in creative writing (among other subjects) is now being developed. Military and industrial personnel are being taught technical and occupational skills as well as traditional school subjects via teaching machines.[1]

Hilgard[2] has stated that programmed instruction derives its support from established principles in the psychology of learning. He listed six principles which support this: programmed instruction recognizes individual differences by beginning where the learner is and permitting him to proceed at his own pace; programmed learning requires activity on the part of the learner; immediate knowledge of results are available; the organized nature of knowledge is emphasized because it requires continuity between the easier and harder concepts; in order to guarantee a high degree of success spaced review is provided; and finally, programmed instruction reduces anxiety because the learner is not threatened by the task.

Research projects have been conducted in the teaching of spelling with the use of programmed instruction and teaching machines. Lumsdaine quotes the following study in his book:

> In the academic year 1957-58 an experiment was carried out on the teaching of spelling to elementary school children under the sponsorship of the U. S. Office of Education. Porter used a simple write-in type of teaching machine. The materials were printed on eight-inch

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[1]National Education Association, Teaching Machines and Programed Instruction: An Introduction for Students and Their Parents, A Report Prepared by the Staff of the National Education Association.

[2]Ernest R. Hilgard, "What Support from the Psychology of Learning?" NEA Journal (Washington: National Education Association, 1961), Vol. 50, No. 8, pp. 20-21.

wide duplicating paper. On the first line of the sheet a question was printed which required the student to respond directly on the sheet through an open window in the machine. The student then moved a lever which rolled the paper up one line; this placed the question and the students' written answer under a sheet of glass, also exposing the correct answer so that he could score himself right or wrong. The lever was then moved to bring the next item into view. The chief functions of the machine were to expose one item at a time and to prevent cheating.

An interesting aspect of the entire program was that no spoken instruction was given to students. Teaching materials paralleled standard lessons in textbooks which were used by the control group as closely as possible. The words taught were exactly the same as those received by the control group.

The teaching-machine program attempted the following sequence of responses:

1. Identification of spelling words in a meaningful sense context.
2. Matching the correct word or given definition.
3. Matching several words on the basis of letter structure.
4. Writing missing letters in words presented in sentence context.

Twenty-two weeks of a normal 34-week program of spelling instruction were given on both the sixth- and the second-grade levels using the teaching machine. Results were measured on standardized achievement test scores. These showed the experimental group to be significantly superior.

Porter reported that there was essentially no relationship between intelligence scores and achievement in the experimental group, but there was a significant positive relationship in the control group. Porter's experiment seemed to indicate that this type of instruction is particularly good for the lower IQ groups. No relationships existed in either group with respect to sex or whether or not students liked the instructional method. To check on the "novelty" factor of the new instruction process, Porter compared first-half and second-half machine scores; no differences were apparent.

In the sixth-grade experimental group a positive relationship existed between the number of responses per lesson required as subjects and subsequent achievement, but no relationship existed between the number of errors per lesson and achievement. In the sixth-grade group, lesson materials were available on a week-by-week basis; yet the experimental group spent only about one-fourth as much time studying as did the control group.

> In the second-grade group, materials were available on an ad libitum basis for 12 weeks. During this time the spread of materials extended to nine lessons; in other words, some students had a high rate of response when released from the more strait-laced type of curriculum . . . . The experimental group gained 1.42 years while the control group gained .90 years. A sign test showed this to be significant at the .01 level. Statistical data for the second grade showed that the experimental group gained .80 years while the control group gained 1.10 years (U test, .005). A second method of rating second-graders was letter position scores in which each letter was scored. In this the experimental group gained 65.6 while the control group gained 37.8 (U test, .001). In an interesting sidelight Porter found that 20 per cent of the second-graders and 10 per cent of the sixth-graders could not match their answers with the answers given in the machine. -- E. B. Fry et al.[1]

Troemel[2] reported a research study involving the use of teaching machines in improving spelling of fourth grade pupils in Sioux Falls who had been classified as having difficulties in both reading and spelling. Using 75 fourth-grade pupils ranging in intelligence from 90 to 110, he compared the use of teaching machines with the conventional teacher method of teaching spelling to remedial reading students. On the three tests used, he found the teacher method superior to the machine method in each case ($p < .05$).

The results of Troemel's study differ from results obtained in many other investigations regarding a comparison of teacher method with machine method. However, the subjects used in Troemel's investigation were selected on the basis of having difficulty in both reading and spelling.

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[1]A. A. Lumsdaine and Robert Glaser, Teaching Machines and Programmed Learning (Washington, D. C.: National Education Association, 1960), pp. 673-674.

[2]Roland Troemel, "What Research Shows About Programmed Learning and Remedial Readers," SDEA Journal Vol. 38, No. 4, March, 1963.

Although many conflicts are reported in the results of research studies relative to teaching machines, most studies describe the superiority of the machine method over teacher method. When such comparisons are not made, the research study usually points out many advantages of teaching machines and programmed materials.

CHAPTER III

METHODS USED BY THREE GROUPS

Three schools were involved in this research project. Two sections of third grade students and two sections of fourth grade students participated from each of the three schools. One school, Cleveland, was designated as the experimental school and students in the project at this school received their instruction in spelling through the use of programmed materials and teaching machines. Two schools were designated as control schools. Control School A, Emerson, used the same list of words which was included in the programmed materials. However, neither programmed materials nor teaching machines were used. Instruction was based on what might be classified as conventional or traditional methods. Control School B, Lincoln, participated strictly as a control school, as the traditional spelling program for third and fourth grade pupils in the Sioux Falls Public Schools was used as the basis of instruction. The word list used in the spelling lessons was not the same as the word list in the programmed materials. No changes were made in the traditional program in Control School B.

The three schools were selected at random. The only factor which minimized the randomness was that it was desirable to select schools in Sioux Falls which were not already involved in major research projects;

especially at the third and fourth grade levels. The populations used appear to be stratified, however, as will be indicated in the chapter involving the analyses of statistical data.

I. THE TIME FACTOR

Some explanation needs to be made concerning the time element in this project. Control School B used traditional (conventional) methods and materials throughout the entire year. Classes in this school started their spelling at the beginning of the school term and continued throughout the entire school year. Their program was similar to the other 17 elementary schools in Sioux Falls which were not included in this project.

Due to the late arrival of programmed materials and teaching machines, the Experimental Group and Control Group A were not able to begin the project until October 22, 1962. The first day any instruction was given with the use of the programmed materials and teaching machines was October 22, 1962. Instruction in spelling using the word list from the programmed materials was delayed in Control Group A until October 22, also.

Students in Control Group A continued to receive their spelling instruction from the programmed word list until they had completed the list of words. Students in the class completed the list at the same time as they were receiving their instruction by conventional methods. The group completed their instruction in spelling from the programmed word list on April 12, 1963.

Students in the Experimental Group worked independently and, consequently, completed the program at various times. February 12, 1963 was the

earliest date of completion for any student in the Experimental Group. The project was terminated on May 15, 1963 to allow time for the extensive post-testing. Sixty-five students in the Experimental Group had not completed the program by that date.

Some differences existed in the assignment of homework in spelling. The teachers at Emerson (Control Group A) were the only ones who consistently assigned homework in spelling. At the third grade level this averaged 15 to 20 minutes per day. In one fourth grade the time for homework averaged 5 to 10 minutes per day and in the other fourth grade in the project an assignment was made only when a low test score was exhibited.

At Lincoln school (Control Group B) no homework in spelling was assigned to the class. Students needing special help received individual assignments.

In the third grade at Cleveland (Experimental School) no assignment was made in spelling. Fourth grade pupils in the project received assignments on an individualized basis, as they needed extra help.

Therefore a difference in time in the assignment of spelling homework did exist. One can only speculate as to how much this affected the outcome.

II. THE EXPERIMENTAL GROUP

As stated earlier, the Experimental Group received their spelling instruction through the use of programmed materials and teaching machines. TMI - Grolier's Modern English Series: Spelling and the Min/Max II machines were used.

The publishers list the program as consisting of 3099 frames (620 pages) with an intended population of "3rd grade up." A third grade reading

skill is required. The publishers estimate that 12 to 24 hours are needed to complete the course although they do not indicate the grade level considered. (If 20 minutes per day were devoted to spelling this would mean 36 to 72 class periods required for completion of course.)

The publishers included 440 words in the program (see Appendix L). Included are words that are likely to be in a student's everyday vocabulary, such as "television," even though they might not appear on a conventional word list, the authors state.

Students were required to go to a central storage for their materials as all four sections in the research project at Cleveland used the same programs and machines. An Answer-Mate was attached to each machine. The Answer-Mate contained a roll of adding machine tape on which the students wrote their answers. Therefore, the programs were not consumed but were reusable.

The two third grade sections used an average of 35 to 40 minutes per day for spelling instruction. This included time necessary to go to the central storage and return with their machines. This transfer of machines and materials consumed an estimated ten minutes per day. The two fourth grade sections used approximately 30 minutes per day for spelling instruction, including time for transfer of machines.

Each student in the four sections used the machines daily. Each student proceeded at his own rate and received help from the teacher when he requested it. Otherwise, each student worked independently.

Tests were constructed by the company for use at the beginning and end of the twelve units in the programmed spelling course. Students took these before attempting each unit and again at the completion of each unit.

Teachers in the experimental group decided that children should repeat the unit if they did not attain a certain score on the post test. Therefore, many of the students repeated several of the units, some more than once. Although the project was not conceived with this in mind, this approach was allowed. It did, however, appreciably increase the time necessary to complete the course.

Letters and an explanation of teaching machines and programmed learning (see Appendix M) were sent to parents of students in the experimental group. Parents were encouraged to seek further information from school officials if they desired it.

A meeting was held with the teachers and principal in the experimental group, the curriculum consultants, and the director of research for the system. At that time, information (see Appendix N) was released concerning the teachers' participation in the experiment.

Instruction sheets (see Appendix O) were distributed to students in the experimental group. These included instructions regarding the use of programmed materials and teaching machines.

III. CONTROL GROUP A

Students from the third and fourth grades at Emerson made up Control Group A. Students in this group received instruction by conventional methods. The spelling word list was the same list as used in the programmed materials. An average of 25 minutes per day was devoted to spelling instruction.

Although it has been stated that the students in Group A received instruction in spelling through conventional methods, this needs some explanation.

The traditional approach to the teaching of spelling in the local school system includes the use of prepared materials. These materials consist of published textbooks.

Therefore, it was impossible for teachers in Group A to follow the conventional or traditional approach. They had to start with a list of words without any other teaching aid. Materials had to be prepared so that the words could be presented in proper context and order.

Much help was received from the consultants in the curriculum department. Some of the materials prepared are presented in Appendix P.

Although this consulting was greatly appreciated by the teachers and was for the improvement of instruction in the school, it did contaminate the research project. Therefore, what is really present in this project is a comparison of the teaching machine method (Experimental Group) with the approach used by the teachers and consultants in Group A with the traditional approach used in Group B.

IV. CONTROL GROUP B

Students in Control Group B received instruction in spelling through the conventional methods and materials used by the 17 elementary schools in the local system which were not participating in the spelling research project. Teachers in this school received the same materials and help which all schools received. Some of this material is in Appendix Q. Approximately 25 minutes per day were devoted to classroom instruction in spelling.

CHAPTER IV

ANALYSIS OF TEACHERS' ANECDOTAL RECORDS AND EVALUATIONS

Teachers in the Experimental Group made two types of evaluations. They maintained a written log of events during the year and completed an evaluation form at the close of the year.

I. TEACHERS' WRITTEN LOG

Teachers in the Experimental Group were asked to maintain an anecdotal record during the year. An analysis of these written records indicates that the four teachers made several entries at the beginning of the project but after the first month of participation made an average of only one entry per month.

At the beginning of the experiment, entries made suggested a considerable amount of frustration:

> 10/19 First time with machines. The children were thrilled and excited with them. Things went well!
>
> 10/20 The teacher has no time to check on childrens' work. Every minute is spent being a mechanic.
>
> 10/22 First day of spelling with the machines. Extremely hectic. The papers will not go through the machine straight. The children have trouble keeping the pages in order.
>
> 10/23 This is our first day with the machines. Confusion! There are faulty machines. No one accomplished too much. Many were frustrated. Very little actual work was done.

10/23 D / of confusion. The boys and girls were excited about the machines. However, they did not work well at all. The machines jammed. I was so busy helping the students fix their machines I could not observe them working.

10/24 Today was still somewhat of a riot. Most of the time was spent teaching the children how to keep boxes in order.

10/24 Machines still causing trouble.

10/26 Things went smoothly today for the first time. It still takes a minimum of 45 minutes and of that about 15 or 20 minutes is devoted to actual work on the program.

10/30 Hectic day! One boy dropped a box and the first six units were all a mess. No time at all to check on youngsters' work.

It appeared that it took each of the classes several days to adjust to the programmed materials and teaching machines. Breakdowns on the machines were quite regular during the first few days. This was caused by two factors: the inexperience of the students and teachers in using these materials and faulty gears and rollers in the machine. The company replaced all of the faulty rollers and a great improvement was noticed immediately. Some of the entries made by teachers after the first few days read:

10/25 Things are beginning to clear up. The children seem to enjoy the work immensely.

10/26 Everyone is more sure of what's going on.

10/30 This week is going smoothly. Machines are now in working order.

All of the teachers expressed concern that the students were racing through the frames too rapidly and attempting to finish the program rather than trying to learn something. Concern was expressed relative to various groups of pupils also. Some comments which verify this are:

10/24 Some pupils seem to think this is a spelling race. Even the brighter students didn't study long enough to know the letter combinations for long vowel sounds.

10/24 The students were more concerned about finishing the sheet and turning the knob than reading the questions.

10/25 The below average in many cases are progressing too fast and I'm sure not understanding.

10/26 There is some problem with neighbors wanting to know how far the other is. Today there was cheating and skipping of pages to keep up with a neighbor.

10/30 One boy who was retained in third grade is up with the brightest youngster in the class. How?

11/2 A few students are not reading the questions. They seem more concerned with turning the knob to see how long a roll of paper they can use.

11/14 The slower pupils seem to be finding the program too difficult to achieve without help. They complete a unit but fail the test.

11/27 I felt that some were under the impression that the machine would learn for them rather than they learn from the machine. This feeling has changed a great deal after many of them have taken a unit over again.

1/28/63 There is a great deal of competition among the youngsters resulting in some dishonesty. They race each other.

3/27 Slow pupils still on Unit 4. Can't seem to get it even with individual help. Average students having great difficulty with Unit 10.

Several comments were made regarding the programmed materials and the boxes in which they are contained:

10/29 Today was a trying one. I had to change eight rollers and re-teach the order of the boxes.

10/30 The programs would work much better if they were typed on one side only -- the pupils get the numbers all mixed up in the boxes.

10/31 Many of the students had trouble in numbering the sheets in the correct order after they had turned their unit over (when they were doing

the second half of the unit). They seem to get confused in numbering after they start the second side.

12/3 Some of the boxes are getting almost impossible to use.

12/18 The entire period was spent taping up the boxes. They really are a mess and as a result the programs are getting torn.

3/4/63 The boxes are getting worse and worse.

Not all of the comments were critical. Several entries indicated praise for the programmed materials and teaching machines.

11/10 "My arm gets tired from turning this knob." "I wish we could work with the machines longer." Comments both for and against--- majority of pupils like them very much.

11/13 The boys and girls are still very happy with the machines. Three of them are repeating units because of low grades. It can be discouraging.

11/15 The superior students are really advancing fast and getting things correct.

1/4/63 Children were anxious for machines again. Every child seems to like working with them.

1/15 The superior student is still thrilled about the work and doing well. The novelty seems to be wearing off for others.

1/28 Motivation continues to be very high. The pupils love the machines. Giving up a day---not using the machines---is worse than giving up recess.

2/1 I see a lot of discouragement with the slower student. Almost every unit must be repeated. Without extra attention it may do no good to repeat it. Due to a number of broken machines I don't have time to give the extra attention. The average child's test is correct but if you ask him to spell the word he can't. So I don't think they are concentrating as they should.

2/5 There has been a carry over in applying word-attack principles as the sound of loud or long vowels among the more able.

2/8 The teaching machines have been a real challenge for the more able student; those with low reading ability are having more difficulties.

2/11 Many pupils are able to get 100 per cent on the post-tests because they can distinguish the right word from the wrong word--but--when the words are pronounced for them to spell they cannot spell them correctly.

2/12 I do not believe the pupils write the entire spelling word enough. This may be the reason why they can distinguish the correct word from the incorrect. Some of the sentences or questions in the progran are not very clear. Many times when pupils have the word "test" they are in doubt of what word they are to write.

2/13 Capable pupils are "sailing" right along with the units. It is serious business now. They like to progress at their own speed and learn the "big" words.

2/15 The time limit has been reduced. When the program was started it took at least 45 minutes. Now they can get the boxes and have them put away in a half hour.

2/19 The pupils think spelling by machine is fun. It has helped some children to become independent. A couple of pupils have improved their work habits and can read and follow through the directions given; which could be a carry over from the program.

3/7 The machines can handle absences well--the student can always take up where he left off. With individual instruction a student can follow the program without breaks or omissions.

3/28 Machine spelling has given more confidence and also fostered a more positive attitude toward spelling to the low-ability child as he has has the satisfying experience of being right most of the time.

5/10 The students who have finished and are working on the book-type program with no machines love it. They accomplish a great deal. They have a longer working period as no boxes to put in order, no machines to get or put away.

5/13 Although the program is well written a few students are not concentrating on the material--they are not absorbing the meat.

II. TEACHERS' EVALUATION FORMS

Teachers in the experimental group completed an evaluation form at the end of the school year. The first question asked was: "Is the subject-matter

of the program academically sound?" Each of the four teachers answered yes to this. Typical of the comments of three of the four teachers was:

> The subject matter is presented in a clear, logical, and understandable manner.

The comment of the fourth teacher (a fourth grade teacher) was:

> I felt the subject-matter was academically sound, but I don't think my pupils read it well enough to understand it thoroughly. I am sure most of the class will not retain the subject-matter.

The second question was: "Was the level of the subject-matter appropriate for your class?" The two third grade teachers indicated that the materials were too difficult. One comment made was:

> Many of the children could not read the material. They answered because of sight and not understanding.

Both fourth grade teachers said that the level was appropriate. However, one added the remark:

> The program was appropriate for about a third of the class, but too difficult for the other two-thirds. Reading was the problem for them.

The next question asked was: "As contrasted with what you have been able to accomplish with other types of learning material, how much do you feel you were able to get your pupils to learn with this program?" The two fourth grade teachers checked "a great deal more than with most other materials." The two third grade teachers checked "about as much as with other materials."

Remarks made by fourth grade teachers were:

> Again I have to divide this class for comment. The top third a great deal more because they need not wait for the slow ones. But the slow ones felt no pressure therefore they didn't study to learn.

> Immediate reinforcement was perhaps the most valuable. The program also stressed reading, vocabulary, and English skills as well as spelling.

Third grade teachers added:

> The mechanics of the machines was fascinating to the children, but the majority of them missed the real learning point of the program.
>
> The superior did very well. Because of the enthusiasm over the machines the children tried hard and I do see improvement.

The next question asked: "The next time you teach a course in this subject or a similar field, would you a) prefer to have programs used for at least part of the course, b) prefer not to have programs used, or c) not care whether programs are used? Each of the four teachers indicated the first choice, that they would prefer to have programs used for at least part of the course, although the third grade teachers qualified their answers by saying if the appropriate level of material was used. One fourth grade teacher remarked:

> I would like to use a similar program for the fast learners. They need to be challenged to do more on their own. I feel that our subject matter is geared to the average learner and as a teacher I spend too much time with the slow learner.

The next question asked: "To what extent did you enjoy using this program with your class: very unenjoyable, unenjoyable, 50-50, enjoyable, very enjoyable." The two fourth grade teachers checked "very enjoyable" and the two third grade teachers checked "50-50".

The two third grade teachers remarked:

> Because of poor mechanisms and messed materials it was often not enjoyable, but the enthusiasm and hard work of <u>most</u> children made it enjoyable.
>
> I had little or no time for individual help or even time to check on the youngsters' progress. There was a constant need for repair, etc. with the machines.

The two fourth grade teachers said:

It was fun to see how well the bright students learned to help themselves with only a minimum amount of guidance and to develop this inner drive to achieve which is so necessary for higher learning.

Although the program kept me very busy and it required much extra time, it was gratifying to see their achievement.

"Do you think that this program should be made available for the use of teachers throughout the country?" The two third grade teachers indicated that they were not sure, adding:

Not for third grade. I didn't think many of the third graders were ready for this type of program. It was too difficult.

The fourth grade teachers answered "yes", saying:

Yes, if the teacher is willing to do a good job of teaching. A program such as this is not easy or an easy way out for a teacher. It requires more time than a text, as 34 pupils are at 34 places, but it is good for children and so should be good for teachers.

Other teachers would have the satisfaction of having offered the pupils a course in which they can work at their own rate and in an active learning situation.

The final question asked the teachers to summarize their opinion of the program. A third grade teacher replied:

Two excellent things about the program are materials as a whole and the enthusiasm the program gave to the children.

The materials contain a lot of repetition on phonics which is good. I didn't agree with all types of test. Some units the child was to pick out the wrong word but did not have to correct it. Most of them could not spell them anyway. The correct test grade often did not mean the child had learned to spell the words. He could only recognize them. Rules and word meanings were clearly stated but because of the difficult words they didn't sink in.

The superior student did well and worked hard. Most of the materials were at his level. The average and slower student missed out on important rules because they couldn't read and understand on their own. With easier material or words I think they would benefit more. Also, I think they need some classroom teaching along with the

machines. The children did benefit greatly by working on their own. You could see this in other areas of study. When assignments were given they seem to read and follow directions better.

The most unenjoyable part is the machine itself. I don't think many of them will be usable again without repair. Materials also were hard to keep in order. It would be much better if each individual had his own materials. In each class some children would spend the most time straightening boxes.

The amount of time used in getting the machines and working with them is too much. Other subjects must be cut down to give this extra time.

The children seemed to compete constantly to finish ahead of the other. Cheating was also done with the more difficult words.

Machines will certainly never take the place of the teacher. The teacher is so busy keeping the machines in working order, filling rollers with paper, and giving pre- and post-tests that she hardly has time to observe the student while he or she is working.

Another third grade teacher said:

The youngsters found it was interesting to handle and work with the mechanics of the machines. This held their interest throughout the entire program. However, the machines did not always work smoothly and this took much of the teacher's time and attention. The papers in the boxes proved to be a constant source of confusion and this increased greatly when the second set of boxes was used. It was impossible to keep the unit pages in order. This also consumed a lot of time.

It was mentioned that one advantage of the program was that each youngster could go at his own speed. Third graders are very competitive and inclined to want to be first. I found this influenced the speed at which they worked. Many of them did not work at their own speed, but at their neighbor's or friend's speed. It was a big race to see who could finish first. As a result, some of those who finished first were not above-average students. Instead they had carelessly hurried through the program.

The program was too hard for most third graders. The above-average youngster was able to grasp most of it. In going through the program, unit by unit, I, as a teacher felt the youngsters should get more out of it than they did. However, something seemed to happen between the boxes and the brain, for the majority of the youngsters did not apply what was presented in the program. Perhaps third graders are not mature enough to work that independently.

The program was very time-consuming because of the trips to and from the supply room to get the boxes. I was not able to check individually with the youngsters as they were working because my attention was needed almost entirely elsewhere, fixing boxes, finding lost pages, etc.

A fourth grade teacher replied:

Many children go through the process of memorizing the week's spelling list by monotonously writing the words over and over. The bright child may already know the words he must study. The slow child will still make mistakes on his text.

The greatest advantage is that students can go at their own pace. The student can follow a program without breaks or omissions. Working on a machine, the student can always take up where he left off. The coherence of the program helps maximize the student's success, for by thoroughly mastering one step he is optimally prepared for the next.

There appear to be gratifying "side effects" as: (1) the pupil learns to follow directions. (2) the satisfying experience of being right most of the time gives confidence and fosters a positive feeling toward spelling. (Machines are patient, they do not shame or disparage.) (3) the pupil is actively learning. (4) he acquires a feeling of independence. (5) reading is improved.

I thought it quite interesting to find out that some students could get the machine test right (picking out the correct word) but when the words were dictated they could not spell them correctly.

The machines do absolutely nothing for handwriting. When a new roll is in they have to have the machines up so high--they stand up in their desks.

The programs had some very good phonetic work included. However, I feel some students did not read it as thoroughly as they should--they seemed more concerned with writing their answer in the blank. Much time was lost in fixing the boxes or fixing the machines.

I would certainly recommend the continued use of programmed learning. In programmed learning the student remains active. If he stops, the program stops. Immediate and frequent reinforcement sustains a lively interest. Generally the students like the programs and therefore they do not let their attention wander. I realize some students need a machine but most of them could accomplish more with a book-type program. I feel the machines waste a great deal of time. (I would like working with the book-type programs and no machines and compare the results.)

I believe this program has many aspects of learning that do not immediately show up. It certainly helps them to work on their own and compete with themselves.

The program is very good for the top students--it challenges them, it takes them much farther than they could go with the class. I feel programmed learning has a great potential.

Another fourth grade teacher replied:

The boxes and the machines were the weak spots, with so many children using the same. The machines were not strong enough to withstand the job required nor the children capable of keeping the program in order. I would like to see either the program in book form or a program per class.

I would like to see a program such as this used in several areas. I feel that machine programming needs teacher or parent guidance. It is a challenge to the bright pupils not to have to wait for the average learner. I found that the average learner in this room has just "caught on" the value of such a program. At first they seemed to feel no inner drive to learn on purpose. Several made the remark that they wished they had studied like this earlier in the program. I also feel that a program like this in different areas would be of great value to the slow learner, if he could have teacher guidance early in the program, or until he understood it himself. Direct results and achievement are very rewarding to slow learners, too. I could not find time to do this as too many pupils were having difficulty.

III. SUMMARY

In summarizing the results of the written logs and end of year evaluations, it appears that several distinctions can be made. It seems that the programs and machines were better accepted at the fourth grade level than at the third grade level. The level of difficulty was, in the opinion of the teachers, more appropriate for fourth grade pupils. Also, the teaching machines themselves were better accepted at the fourth grade level.

There appeared to be better acceptance of the programmed materials (the spelling course) than there was of the teaching machines. Great difficulties were encountered in the use of the machines. Although this was more

evident at the beginning of the project, it did continue throughout the entire project. It is felt that many times when the teachers said something critical of the "program" that they were in reality critizing the "machine."

There appeared to be concern on the part of each teacher that the program and machine were more appropriate for the average and above-average student. They expressed the feeling that the below average student received little help from the program.

The teachers were kept so busy fixing machines and helping students find their place in the programmed materials that there was little if any time available to help students individually with spelling or to observe students' behavior. It had been hoped that different types of observations could have been made with the focus on behavior and reaction of students. Apparently this was impossible to do because of the time involved.

Teachers felt that the motivation of the pupils remained at a high level throughout the entire experiment. They also said that there appeared to be some carry over for students as they were learning to work independently and follow directions.

CHAPTER V

ANALYSIS OF STUDENTS' EVALUATION

Students in the four classes in the Experimental Group were asked to complete a questionnaire at the end of the research project. An open-ended question was included which asked: "In your own words say what you thought of the spelling machines. What did you like about the program? What didn't you like about it, etc.?" Over 95 per cent of the students indicated they liked the machines. Several individuals indicated they liked the machines, but that they had great difficulty with them from a mechanical view-point.

The answers to the remaining questions are summarized in Table I, page 35. It can be said that the response by each group to each question is very positive. If these responses are representative of the students' feelings a positive attitude toward teaching machines existed at the end of the project.

There is little difference in positive response between third and fourth grade pupils. The fourth grade pupils generally gave a higher per cent response to the items referring to their like of teaching machines. One question, number four, referred to the amount of learning the students felt they had accomplished. The third grade students gave a higher per cent of positive response to this question.

TABLE I

PERCENTAGE RESULTS OF STUDENTS' EVALUATION

QUESTION	Grade 3	Grade 4	Total
1. If spelling machines had not been used in spelling class, I believe	(n = 59)	(n = 64)	(n = 123)
_____ I would have learned less in spelling	61	80	71
_____ It would have made no difference	22	9	15
_____ I would have learned more in spelling	17	11	14
2. In comparing work done using the spelling machines with studying in the textbook, I feel that, with the same amount of time and effort:	(n = 58)	(n = 63)	(n = 121)
_____ I learned much more with the machines	69	62	65
_____ I learned somewhat more with the machines	9	25	17
_____ I feel there is no difference	15	3	9
_____ I learn somewhat more from studying textbooks	7	10	8
_____ I learn much more from studying textbooks	0	0	0
3. If I was to take another course in this subject or a similar subject, I would:	(n = 58)	(n = 63)	(n = 121)
_____ Choose to have machines used for at least part of the course	72	80	76
_____ Choose not to have machines used	9	6	7
_____ Not care whether machines are used or not	19	14	17
4. How much do you think you learned from using spelling machines?	(n = 57)	(n = 63)	(n = 120)
_____ Learned nothing	0	0	0
_____ Learned a little	2	2	2
_____ Learned a medium amount	7	21	14
_____ Learned quite a bit	32	27	29
_____ Learned very much	60	51	55
5. How much did you enjoy going through this program using the spelling machines?	(n = 57)	(n = 64)	(n = 121)
_____ Very much disliked	4	2	2
_____ Disliked	2	2	2
_____ Don't know	18	19	18
_____ Enjoyable	23	31	27
_____ Very enjoyable	54	47	50

To summarize, it appears that through the use of multiple choice and open-ended questions, students in the Experimental Group possessed a positive feeling toward programmed materials and teaching machines at the completion of this project.

CHAPTER VI

STATISTICAL ANALYSES OF DATA

The first factor to be considered in the statistical analysis of data is the time factor involved in the research project. The total length of time used during the school year varied among the three schools. The project continued for the entire school year (38 weeks) in Control School B. In Control School A, the project was completed in 24 weeks. In the Experimental School, students progressed at individual rates and as a result the length of the project varied from 15 to 28 weeks. Some of the students in the Experimental Group did not complete the course in the 28 weeks.

The amount of time per day devoted to classroom instruction in spelling is difficult to ascertain accurately. It appears that each control group used approximately 25 minutes per day, on the average, for classroom spelling instruction. The Experimental Group used about 35 minutes per day for spelling instruction but it is estimated that approximately 10 minutes per day were devoted to carrying machines and program from room to room and reorganizing the program in the correct order after other students had used ' Therefore, it appears that the three groups used about an equal amount of time per day, on the average, if the time for storage, movement and reorganization is not considered.

Differences existed in the amount of homework assigned. Students in Control Group A appeared to receive homework in spelling regularly while students in the other two groups were not assigned homework except on an individual basis as special needs were exhibited.

Table II, page 39, gives a tabulation of the per cent of students in the Experimental Group completing various number of units. The programmed spelling course contained twelve units. It can be observed from Table II that 36 per cent of the third grade pupils and 55 per cent of the fourth grade pupils completed the entire course. Likewise, it can be seen that two per cent of the fourth grade pupils (one student) proceeded no further than Unit 3. In interpreting these figures it must be remembered that the students had to repeat units if their unit post-test score did not reach a certain level prescribed by the teacher.

Table III, page 40, describes the per cent of those who finished the course by number of weeks necessary for completion. It can be seen, for example, that 64 per cent of the third grade pupils and 44 per cent of the fourth grade pupils did not complete the programmed spelling course. Of those completing the course, 25 per cent of the third grade pupils and 38 per cent of the fourth grade pupils completed the course in 20 weeks or less.

The investigator wished to determine whether differences existed among the three groups at the beginning of the research project. Two possible variables, an intelligence score and a spelling achievement score, were selected for an analysis of variance. The Large-Thorndike intelligence score and the spelling subtest of the Iowa Tests of Basic Skills were used.

TABLE II

PER CENT OF STUDENTS IN EXPERIMENTAL GROUP
COMPLETING VARIOUS NUMBER OF UNITS

GRADE	UNITS COMPLETED									
	3	4	5	6	7	8	9	10	11	12
3	0	4	4	11	2	5	12	16	11	36
4	2	0	3	2	0	6	9	15	8	55
TOTAL 3 & 4	1	2	3	6	1	6	11	16	9	47

TABLE III

PER CENT OF STUDENTS IN EXPERIMENTAL GROUP COMPLETING PROGRAMMED SPELLING COURSE IN VARIOUS NUMBER OF WEEKS

Number of weeks necessary for completion of course	GRADE					
	3		4		Total 3 & 4	
	Per cent of all 3rd graders	Per cent of 3rd graders who finished	Per cent of all 4th graders	Per cent of 4th graders who finished	Per cent of all 3rd & 4th graders	Per cent of 3rd and 4th graders who finished
	(n = 56)	(n = 20)	(n = 66)	(n = 37)	(n = 122)	(n = 57)
15	2	5	0	0	1	2
16	0	0	2	3	1	2
17	2	5	2	3	2	4
18	2	5	5	8	3	7
19	0	0	5	8	2	5
20	4	10	9	16	7	14
21	2	5	3	5	2	5
22	0	0	2	3	1	2
23	4	10	0	0	2	4
24	9	25	5	8	7	14
25	4	10	5	8	4	9
26	4	10	0	0	2	4
27	5	15	17	30	11	25
28	0	0	5	8	2	5
Did not complete course	64	--	44	--	53	--

To test the significance of the differences among schools, the null hypothesis was assumed. In other words, a homogeneous population was postulated, from which variation among samples as great as were present could reasonably be attributed to sampling fluctuation. A test for determing whether the null hypothesis (i. e., there is no difference) is tenable was made.

Table IV, page 42, is the analysis of variance of intelligence scores among the three groups (Experimental Group and Control Group A and B). The two sections of third grade pupils and two sections of fourth grade pupils in each group are used for a total of 336 degrees of freedom. At 2 and 334 degrees of freedom, an F value of 1.07 is obtained. This is not a significant F value because at 2 and 400 degrees of freedom (2 and 334 d. f. are needed--closest table figures are 2 and 400 d. f.) an F value of 3.02 is required for $p<.05$ and 4.66 for $p<.01$. Thus, evidence is not available for rejecting the null hypothesis or the idea that students in the various schools do not differ in intelligence scores as represented by the test.

Tables V and VI, pages 43 and 44, contain analyses of variance of intelligence scores among schools but in Table V the data is for third grade pupils only and Table VI contains data for fourth grade pupils only. At the third grade level, an F value is obtained which is not statistically significant. Therefore, the idea that there are no differences between third grade pupils among schools cannot be rejected. The null hypothesis is sustained. However, at the fourth grade level the differences are significant at the five per cent level of confidence. The mean IQ scores for fourth grade pupils are 111.12 at the Experimental School, 113.29 at Control School A, and 108.26 at Control School B. This would indicate that an analysis of covariance should be used in the analysis of the data. However, simple "t" tests will be made and, therefore, the small differences which do exist should be recognized and noted in the interpretation of the "t" tests.

The other possible variable with which there was concern was spelling achievement scores. The analysis of variance for the spelling subtest of the Iowa Tests of Basic Skills is

TABLE IV

ANALYSIS OF VARIANCE OF LORGE-THORNDIKE INTELLIGENCE SCORES AMONG THREE SCHOOLS (THIRD AND FOURTH GRADE)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Schools	2	413	206.5
Within	334	64,307	192.5
Total	336	64,720	(192.6)

$$F_{2,334} = \frac{206.5}{192.5} = 1.07 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, an F value of 3.02 is required for $p < .05$ and 4.66 for $p < .01$.)

TABLE V

ANALYSIS OF VARIANCE OF LORGE-THORNDIKE INTELLIGENCE SCORES AMONG THREE SCHOOLS (THIRD GRADE ONLY)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Schools	2	104	52.0
Within	155	18,362	118.0
Total	157	18,466	(117.6)

$$F_{2,155} = \frac{52.0}{118.5} = 0.44 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, an F value of 3.02 is required for $p < .05$ and 4.66 for $p < .01$.)

TABLE VI

ANALYSIS OF VARIANCE OF LORGE-THORNDIKE INTELLIGENCE SCORES AMONG THREE SCHOOLS (FOURTH GRADE ONLY)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Schools	2	755	377.5
Within	176	20,512	116.5
Total	178	21,267	(119.5)

$$F_{2,176} = \frac{377.5}{116.5} = 3.24 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, an F value of 3.02 is required for $p < .05$ and 4.66 for $p < .01$.)

described in Table VII, page 46. An F value of 2.30 is obtained. Since this F value is not statistically significant the null hypothesis that there are no differences in spelling achievement as represented by these test scores cannot be rejected. It must be sustained.

Tables VIII and IX, pages 47 and 48 contain analyses of variance for the spelling subtest. Table VIII describes the analysis for third grade pupils only while Table IX contains the data for fourth grade pupils only. In each case an F value has been obtained which is not statistically significant. Therefore, the null hypothesis cannot be rejected.

The above data is included to indicate that the three groups were equal in intelligence (except at the fourth grade level) and spelling achievement at the beginning of the experiment in so far as the test scores were representative of intelligence and spelling achievement. There are other possible variables which could have been included but these are the two which were the most important, it is felt.

In addition to the analysis of the control variables, analyses of variance were made on the pre tests of the five criteria tests. Tables X, XI, XII, XIII, and XIV, pages 49 to 53, list the F values for the analyses of the How I Like School Inventory, National Achievement Tests in Spelling, word list from programmed spelling course, word list to measure transfer of spelling skills, and rules of spelling test, respectively. In the case of three of the criteria tests, F values were obtained which are not statistically significant. Therefore, the null hypothesis can not be rejected and it can not be said that differences existed among the groups at the beginning of the experiment in these three tests.

However, differences significant $<.05$ were computed for the How I Like School inventory and differences significant $<.001$ was computed for the rules of spelling test. The mean scores of the rules of spelling test are 30.2 for Experimental School, 36.7 for Control School A, and 32.1 for Control School B. These differences need to be considered in the interpretation of the "t" tests.

TABLE VII

ANALYSIS OF VARIANCE OF IOWA TEST OF BASIC SKILLS SPELLING SUBTEST AMONG THREE SCHOOLS (THIRD AND FOURTH GRADE)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Schools	2	571	285.5
Within	326	40,487	124.2
Total	328	41,058	(125.2)

$$F_{2,326} = \frac{285.5}{124.2} = 2.30 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, an F value of 3.02 is required for $p<.05$ and 4.66 for $p<.01$.)

TABLE VIII

ANALYSIS OF VARIANCE OF IOWA TEST OF BASIC SKILLS SPELLING SUBTEST AMONG SCHOOLS (THIRD GRADE ONLY)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Schools	2	114	57.0
Within	150	20,861	139.1
Total	152	20,975	(138.0)

$$F_{2,150} = \frac{57.0}{139.1} = 0.41 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, an F value of 3.02 is required for $p < .05$ and 4.66 for $p < .01$.)

TABLE IX

ANALYSIS OF VARIANCE OF IOWA TESTS OF BASIC SKILLS
SPELLING SUBTEST AMONG SCHOOLS
(FOURTH GRADE ONLY)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Schools	2	206	103.0
Within	173	32,006	185.0
Total	175	32,212	(184.1)

$$F_{2,173} = \frac{103.0}{185.0} = 0.56 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, an F value of 3.02 is required for $p < .05$ and 4.66 for $p < .01$.)

TABLE X

ANALYSIS OF VARIANCE OF "HOW I LIKE SCHOOL" INVENTORY AMONG SCHOOLS (THIRD AND FOURTH GRADE PUPILS)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares
Schools	2	233	116.5
Within	328	11,634	35.5
Total	330	11,867	(36.0)

$$F_{2,328} = \frac{116.5}{35.5} = 3.28 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, an F value of 3.02 is required for $p<.05$ and 4.66 for $1<.01$.)

TABLE XI

ANALYSIS OF VARIANCE OF NATIONAL ACHIEVEMENT TEST IN SPELLING AMONG SCHOOLS (THIRD AND FOURTH GRADE PUPILS)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Schools	2	839	419.5
Within	331	50,679	153.1
Total	333	51,518	(154.7)

$$F_{2,331} = \frac{419.5}{153.1} = 2.74 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, and F value of 3.02 is required for $p < .05$ and 4.66 for $p < .01$.)

TABLE XII

ANALYSIS OF VARIANCE OF WORD LIST FROM PROGRAMMED SPELLING COURSE AMONG SCHOOLS (THIRD AND FOURTH GRADE PUPILS)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Schools	2	378	189.0
Within	333	29,437	88.4
Total	335	29,815	(89.0)

$$F_{2,333} = \frac{189.0}{88.4} = 2.14 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, an F value of 3.02 is required for $p < .05$ and 4.66 for $p < .01$.)

TABLE XIII

ANALYSIS OF VARIANCE OF WORD LIST TO MEASURE TRANSFER OF SPELLING SKILLS AMONG SCHOOLS (THIRD AND FOURTH GRADE PUPILS)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Schools	2	487	243.5
Within	269	23,550	87.5
Total	271	24,037	(88.7)

$$F_{2,269} = \frac{243.5}{87.5} = 2.78 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, an F value of 3.02 is required for $p<.05$ and 4.66 for $p<.01$.)

TABLE XIV

ANALYSIS OF VARIANCE OF TEST ON RULES OF SPELLING AMONG SCHOOLS (THIRD AND FOURTH GRADE PUPILS)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square
Schools	2	2,208	1104.0
Within	331	41,471	125.3
Total	333	43,679	(131.2)

$$F_{2,331} = \frac{1104}{1253} = .8\ 81 \text{ (n.s.)}$$

(At 2 and 400 degrees of freedom, an F value of 3.02 is required for $p < .05$ and 4.66 for $p < .01$.)

Tables XV, XVI, XVII, XVIII, and XIX, pages 55 to 59, contain the statistical data describing the pre- and post-test results of each of the five criteria instruments. Each table lists the differences between pre- and post-test results, standard deviations, "t" test, and probability. Results are tabulated by school, grade level, and ability group within grade level as determined by an intelligence test score.

Data relative to the How I Like School inventory are contained in Table XV. This inventory is a device whereby pupils express their likes and dislikes about school by answering "Yes" or "No" to 50 questions. It, like all of the other criteria instruments, was administered at the beginning and again at the termination of the project. It can be observed from Table XV that little gain was made during the year's time on this instrument. In several instances the difference between pre- and post-test scores was negative. For schools, the only statistically significant gain was with the total third and fourth grade class at Lincoln ($p < .05$). By grade levels, statistically significant gains were made at the third grade level, low third in ability, at Lincoln ($p < .01$); the total third grade at Lincoln ($p < .01$); and the fourth grade level, top third in ability, at Emerson ($p < .001$).

It can be said that based on the data contained in Table XV there was little change in students in any of the three schools in attitude toward school as measured by the How I Like School inventory. Some isolated gains were made but these were few in number.

The results of the National Achievement Tests in spelling are tabulated in Table XVI. Statistically significant gains were made at most grade and

TABLE XV

A COMPARISON OF PRE AND POST TEST SCORES ON THE HOW I LIKE SCHOOL INVENTORY BETWEEN EXPERIMENTAL AND CONTROL GROUPS

GRADE	Level of Groups (by Intelligence) 1-Top Third 2-Middle Third 3-Lower Third	NUMBER			MEAN SCORES (X)									"t"			PROBABILITY		
					Lincoln			Emerson			Cleveland								
		Lincoln	Emerson	Cleveland	1	2	3	1	2	3	1	2	3	Lincoln	Emerson	Cleveland	Lincoln	Emerson	Cleveland
3	1	17	15	18	40.1	43.5	3.4	40.2	38.6	-1.6	41.8	43.5	1.7	1.6683	0.5776	1.5043	n.s.	n.s.	n.s.
	2	16	15	19	38.8	42.4	3.6	38.7	38.3	-0.4	40.6	41.1	0.5	1.5000	0.1650	0.4444	n.s.	n.s.	n.s.
	3	18	15	18	36.9	42.4	5.5	36.5	35.6	-0.9	39.9	39.2	-0.7	2.9781	0.3275	0.2963	<.01	n.s.	n.s.
	Total	51	45	55	38.6	42.8	4.2	38.4	37.6	-0.8	40.8	41.3	0.5	3.4917	0.4966	0.5051	<.001	n.s.	n.s.
4	1	18	19	22	42.3	43.2	0.9	32.7	43.7	11.0	42.8	43.5	0.7	0.5754	4.0072	0.5489	n.s.	<.001	n.s.
	2	18	19	22	39.2	39.7	0.5	43.8	42.5	-1.3	43.6	42.8	-0.8	0.2446	1.1008	0.4425	n.s.	n.s.	n.s.
	3	17	20	22	40.8	38.5	-2.3	43.2	41.8	-1.4	41.3	39.2	-2.1	0.6774	0.7258	0.9727	n.s.	n.s.	n.s.
	Total	53	58	66	40.8	40.5	-0.3	42.7	43.4	0.7	42.6	41.8	-0.8	0.2830	0.5083	0.6822	n.s.	n.s.	n.s.
3 & 4	1	35	34	40	41.2	43.3	2.1	41.9	41.5	-0.4	42.3	43.5	1.2	1.7583	0.2040	1.3146	n.s.	n.s.	n.s.
	2	34	34	41	39.0	40.9	1.9	41.4	40.8	-0.6	42.2	42.0	-0.2	1.2905	0.4307	0.1579	n.s.	n.s.	n.s.
	3	35	35	40	38.8	40.5	1.7	40.3	39.1	-1.2	40.7	39.2	-1.5	1.1342	0.6610	0.9091	n.s.	n.s.	n.s.
	Total	104	103	121	39.7	41.6	1.9	40.8	40.9	0.1	41.7	41.6	-0.1	2.3580	0.1000	0.2313	<.05	n.s.	n.s.

(Column 1 = Pre Test Mean Score, 2 = Post Test Mean Score, 3 = Difference in Mean Scores. All scores are raw scores. At 60 df, a "t" value of 2.000 is required for $p<.05$, 2.660 for $p<.01$, and 3.460 for $p<.001$. At 20 df, a "t" value of 2.086 is required for $p<.05$, 2.845 for $p<.01$, 3.850 for $p<.001$. All values of "t" indicated above are between pre test and post test mean scores for school and level shown.)

TABLE XVI

A COMPARISON OF PRE AND POST TEST SCORES ON THE NATIONAL ACHIEVEMENT TEST IN SPELLING BETWEEN EXPERIMENTAL AND CONTROL GROUPS

GRADE	Level of Groups (by Intelligence) 1-Top Third 2-Middle Third 3-Lower Third	NUMBER			MEAN SCORES (X)									"t"			PROBABILITY		
					Lincoln			Emerson			Cleveland								
		Lincoln	Emerson	Cleveland	1	2	3	1	2	3	1	2	3	Lincoln	Emerson	Cleveland	Lincoln	Emerson	Cleveland
3	1	18	16	19	18.3	35.7	17.4	21.7	33.8	12.1	19.6	30.3	10.7	4.9127	3.4655	3.1826	<.001	<.01	<.01
	2	15	15	19	18.4	35.8	17.4	19.3	31.0	11.7	16.5	27.0	10.5	4.4051	3.2493	2.6391	<.001	<.01	<.05
	3	18	15	19	13.2	30.6	17.4	15.3	22.5	7.2	13.2	24.7	11.5	4.6005	1.3891	3.0912	<.001	n.s.	<.01
	Total	51	46	57	16.5	33.9	17.4	18.3	29.2	10.9	16.4	27.3	10.9	7.9862	4.1862	5.0417	<.001	<.001	<.001
4	1	18	19	22	28.1	44.9	6.8	38.7	44.2	5.5	33.3	44.8	11.5	4.0655	3.3827	8.2500	<.001	<.01	<.001
	2	18	19	22	22.6	34.6	12.0	33.3	40.6	7.3	30.9	41.5	10.6	1.3794	3.5833	5.0190	n.s.	<.01	<.001
	3	17	20	22	16.9	28.9	12.0	19.9	31.3	11.4	16.6	33.2	16.6	3.0075	5.5366	6.0993	<.01	<.001	<.001
	Total	53	58	66	26.1	36.3	10.2	30.5	38.6	8.1	26.9	39.8	12.9	4.4242	4.8214	7.8659	<.001	<.001	<.001
3 & 4	1	36	35	41	28.2	40.3	12.1	30.9	39.4	8.5	27.0	38.1	11.1	4.5299	3.4372	4.7725	<.001	<.01	<.001
	2	33	34	41	20.7	35.1	14.4	27.1	36.4	9.3	24.2	34.8	10.6	5.5676	3.8264	3.9328	<.001	<.001	<.001
	3	35	35	41	15.0	29.8	14.8	17.9	27.5	9.6	15.0	29.3	14.3	5.4106	3.6873	6.0638	<.001	<.001	<.001
	Total	104	104	123	21.4	35.1	13.7	25.3	34.4	9.1	22.1	34.0	11.9	8.2771	5.6460	7.8684	<.001	<.001	<.001

(Column 1 = Pre Test Mean Score, 2 = Post Test Mean Score, 3 = Difference in Mean Scores. All scores are raw scores. At 60 df, a "t" value of 2.000 is required for $p<.05$, 2.660 for $p<.01$, and 3.460 for $p<.001$. At 20 df, a "t" value of 2.086 is required for $p<.05$, 2.845 for $p<.01$, 3.850 for $p<.001$. All values of "t" indicated above are between pre test and post test mean scores for school and level shown.)

TABLE XVII

A COMPARISON OF PRE AND POST TEST SCORES ON THE TEST ON WORD LIST FROM PROGRAMMED SPELLING COURSE BETWEEN EXPERIMENTAL AND CONTROL GOUPS

GRADE	Level of Groups (by Intelligence) 1-Top Third 2-Middle Third 3-Lower Third	NUMBER			MEAN SCORES ($\bar{X}$)									"t"			PROBABILITY		
					Lincoln			Emerson			Cleveland								
		Lincoln	Emerson	Cleveland	1	2	3	1	2	3	1	2	3	Lincoln	Emerson	Cleveland	Lincoln	Emerson	Cleveland
3	1	18	16	19	16.4	30.8	14.4	17.7	31.4	13.7	15.7	26.7	11.0	5.2904	4.8892	3.8869	<.001	<.001	<.001
	2	16	15	19	14.8	28.4	13.6	16.3	30.4	14.1	14.1	24.1	10.0	4.5482	4.5387	3.3023	<.001	<.001	<.01
	3	18	15	19	12.0	26.2	14.2	14.0	21.9	7.9	10.2	21.9	11.7	4.7559	1.9101	4.0729	<.001	n.s.	<.001
	Total	52	46	57	14.4	28.5	14.1	16.0	28.0	12.0	13.3	24.2	10.9	8.3491	5.9304	6.4059	<.001	<001	<.001
4	1	18	19	22	29.2	34.9	5.7	30.5	38.4	7.9	27.8	37.8	10.0	4.8889	6.6949	8.8496	<.001	<.001	<.001
	2	18	19	22	19.1	28.7	9.6	26.7	36.4	9.7	26.1	35.5	9.4	5.0052	6.8239	7.0149	<.001	<.001	<.001
	3	17	20	22	15.9	22.9	7.0	17.3	32.0	14.7	17.3	29.9	12.6	2.6148	9.7351	6.9290	<.05	<.001	<.001
	Total	53	58	66	21.5	29.0	7.5	24.7	35.5	10.8	23.7	34.4	10.7	4.8954	9.5000	9.6126	<.001	<.001	<.001
3 & 4	1	36	35	41	22.8	32.9	10.1	24.6	35.2	10.6	22.2	32.6	10.4	5.4620	5.6064	7.4922	<.001	<.001	<.001
	2	34	34	41	17.0	28.6	11.6	22.1	33.7	11.6	20.5	30.2	9.7	6.5682	6.2193	4.7822	<.001	<.001	<.001
	3	35	35	41	13.9	24.6	10.7	15.9	27.6	11.7	14.0	26.2	12.2	5.2647	5.5258	6.6413	<.001	<.001	<.001
	Total	105	104	123	18.0	28.7	10.7	20.9	32.2	11.3	18.9	29.7	10.8	9.0504	9.9123	9.1356	<.001	<.001	<.001

(Column 1 = Pre Test Mean Score, 2 = Post Test Mean Score, 3 = Difference in Mean Scores. All scores are raw scores. At 60 df, a "t" value of 2.000 is required for $p < .05$, 2.660 for $p < .01$, and 3.460 for $p < .001$. At 20 df, a "t" value of 2.086 is required for $p < .05$, 2.845 for $p < .01$, 3.850 for $p < .001$. All values of "t" indicated above are between pre test and post test mean scores for school and level shown.)

A COMPARISON OF PRE AND POST TEST SCORES ON THE TEST ON RULES OF SPELLING BETWEEN EXPERIMENTAL AND CONTROL GROUPS

GRADE	Level of Groups (by Intelligence) 1- Top Third 2-Middle Third 3-Lower Third	NUMBER			MEAN SCORES (X)									"t"			PROBABILITY		
					Lincoln			Emerson			Cleveland								
		Lincoln	Emerson	Cleveland	1	2	3	1	2	3	1	2	3	Lincoln	Emerson	Cleveland	Lincoln	Emerson	Cleveland
3	1	18	16	18	33.9	51.4	17.5	35.4	50.8	15.4	29.6	47.5	17.9	6.4338	5.6313	5.3086	<.001	<.001	<.001
	2	17	15	19	29.9	50.7	20.8	32.9	48.1	15.2	26.4	45.7	19.3	6.0378	5.4676	6.0344	<.001	<.001	<.001
	3	18	15	19	26.5	45.0	18.5	26.7	34.9	8.2	20.1	39.2	19.1	4.8052	1.4437	6.3654	<.001	n.s.	<.001
	Total	53	46	56	30.1	49.0	18.9	31.7	44.7	13.0	25.3	44.1	18.8	9.4925	5.2000	9.6907	<.001	<.001	<.001
4	1	18	19	22	42.2	53.6	11.4	48.3	59.5	11.2	41.2	60.1	18.9	5.4760	7.9366	11.9050	<.001	<.001	<.001
	2	18	19	22	31.2	42.2	11.0	41.3	53.5	12.2	36.0	55.1	19.1	3.3084	6.4603	7.2159	<.001	<.001	<.001
	3	15	20	21	28.3	38.9	10.6	32.8	49.8	17.0	25.3	46.1	20.8	3.0199	7.2863	7.4464	<.01	<.001	<.001
	Total	51	58	65	34.2	45.3	11.1	40.6	54.2	13.6	34.4	54.0	19.6	5.2524	9.1689	11.1637	<.001	<.001	<.001
3 & 4	1	36	35	40	38.1	52.5	14.4	42.4	55.5	13.1	36.2	54.6	18.4	7.8478	6.6853	8.2883	<.001	<.001	<.001
	2	35	34	41	30.6	46.3	15.7	37.6	51.1	13.5	31.5	50.7	19.2	6.3846	7.4751	8.4079	<.001	<.001	<.001
	3	33	35	40	27.3	42.2	14.9	30.1	43.4	13.3	22.8	42.9	20.1	5.6053	4.3475	9.3692	<.001	<.001	<.001
	Total	104	104	121	32.1	47.2	15.1	36.7	50.0	13.3	30.2	49.4	19.2	10.2945	8.7632	13.3333	<.001	<.001	<.001

(Column 1 = Pre Test Mean Score, 2 = Post Test Mean Score, 3 = Difference in Mean Scores. All scores are raw scores. At 60 df, a "t" value of 2.000 is required for $p<.05$, 2.660 for $p<.01$, and 3.460 for $p<.001$. At 20 df, a "t" value of 2.086 is required for $p<.05$, 2.845 for $p<.01$, 3.850 for $p<.001$. All values of "t" indicated above are between pre test and post test mean scores for school and level shown.)

A COMPARISON OF PRE AND POST TEST SCORES ON THE TEST ON WORD LIST TO MEASURE TRANSFER OF SPELLING SKILLS BETWEEN EXPERIMENTAL AND CONTROL GROUPS

GRADE	Level of Groups (by Intelligence) 1-Top Third 2-Middle Third 3-Lower Third	NUMBER			MEAN SCORES (X̄)									"t"			PROBABILITY		
					Lincoln			Emerson			Cleveland								
		Lincoln	Emerson	Cleveland	1	2	3	1	2	3	1	2	3	Lincoln	Emerson	Cleveland	Lincoln	Emerson	Cleveland
3	1	18	15	18	16.1	30.2	14.1	16.7	31.0	14.3	17.2	28.1	10.9	4.4936	5.4280	3.8521	<.001	<.001	<.01
	2	16	15	19	17.6	29.7	12.1	17.6	30.3	12.7	13.6	24.8	11.2	4.5261	7.0369	3.4329	<.001	<.001	<.01
	3	18	15	18	12.7	24.6	11.9	12.9	23.3	10.4	11.3	23.9	12.6	4.0000	2.5700	4.1316	<.001	<.05	<.001
	Total	52	45	55	15.4	28.1	12.7	15.7	28.2	12.5	14.0	25.6	11.6	7.3468	6.5497	6.5056	<.001	<.001	<.001
4	1	18		22	31.6	37.5	5.9				27.6	38.2	10.6	4.4962		7.7868	<.001		<.001
	2	18		22	19.8	28.2	8.4				26.4	36.7	10.3	4.0531		6.4099	<.001		<.001
	3	16		22	15.6	22.5	6.9				15.9	31.0	15.1	2.2754		8.6023	<.05		<.001
	Total	51		66	23.0	30.1	7.1				23.3	35.3	12.0	4.3434		10.1008	<.001		<.001
3 & 4	1	36		40	23.8	33.8	10.0				22.9	33.7	10.8	4.5045		5.7796	<.001		<.001
	2	34		41	18.8	29.0	11.2				20.4	31.2	10.8	6.1145		4.8468	<.001		<.001
	3	34		40	14.1	23.6	9.5				13.8	27.8	14.0	4.5166		7.8483	<.001		<.001
	Total	103	45	121	19.2	29.2	10.0				19.1	30.9	11.8	7.9920		9.9244	<.001		<.001

(Column 1 = Pre Test Mean Score, 2 = Post Test Mean Score, 3 = Difference in Mean Scores. All scores are raw scores. At 40 df, a "t" value of 2.000 is required for $p < .05$, 2.660 for $p < .01$, and 3.460 for $p < .001$. At 20 df, a "t" value of 2.086 is required for $p < .05$, 2.845 for $p < .01$, 3.850 for $p < .001$. All values of "t" indicated above are between pre test and post test mean scores for school and level shown.)

ability levels. The greatest gain for school was made by Lincoln with 13.9 raw score units (compared to 9.1 for Emerson and 11.9 for Cleveland). The greatest gain for third grade was made at Lincoln with 17.4 points (compared to 10.9 each for Emerson and Cleveland). Students at Cleveland made the greatest gain at fourth grade with 12.9 points (compared to 10.2 at Lincoln and 8.1 at Emerson).

At the third grade level, each of the three ability groups at Lincoln made equal gain. The top third at Emerson and the low third at Cleveland made the greatest gain within their respective schools among ability groups at the third grade level.

At the fourth grade level, the middle and low thirds made equal greatest gain at Lincoln. At Emerson and Cleveland the low thirds made the greatest gain at the fourth grade level.

Table XVII contains the data relative to the word list from the programmed course in spelling. Analysis of variance of the three schools showed them to be equal on the results of this test at the beginning of this study. Data in Table XVII indicate that statistically significant gains were made by most ability levels at both grade levels. The greatest gain by school was made at Emerson with 11.3 raw score points of gain (compared to 10.8 for Cleveland and 10.7 for Lincoln). Students at Lincoln made the greatest gain at the third grade level with 14.1 points (compared to 12.0 points at Emerson and 10.9 at Cleveland). The greatest gain at the fourth grade level was made at Emerson with 10.8 points (followed by Cleveland with 10.7 points and Lincoln with 7.5 points).

Data relative to the rules of spelling test are contained in Table XVIII. Analysis of variance of the three schools determined them not to be equal in the results of this test at the beginning of the project. Statistically significant gains were made by most ability groups at both grade levels. The greatest gain by school was made a Cleveland with 19.2 raw score points (compared to 15.1 at Lincoln and 13.3 at Emerson). Students at Lincoln made the greatest gain at the third grade level with 18.9 points (compared to 18.8 at Cleveland and 13.0 at Emerson). Greatest gain at the fourth grade level was made at Cleveland with a mean gain of 19.6 points (compared to 13.6 points at Emerson and 11.1 at Lincoln).

The results of the word list test to measure transfer of spelling skills are contained in Table XIX. Analysis of variance among schools revealed them to be equal on this test at the beginning of the study. Statistically significant gains were made by all ability groups at all grade levels except at Emerson. The pre-testing was not accomplished at the fourth grade level at Emerson. Therefore, comparisons cannot be made with this group. The greatest gain by school was made at Cleveland with 11.8 raw score points (compared to 10.0 at Lincoln). The greatest gain in the third grade was made at Lincoln with 12.7 points (compared to 11.6 for Cleveland and 12.5 for Emerson). Cleveland made the greatest gain at the fourth grade level with 12.0 points (compared to 7.1 for Lincoln).

The following analysis excludes the results of the How I Like School inventory but includes the other criteria tests. Considering total population included in the study in each school, Lincoln made the greatest gain on

one test, Emerson on one test, and Cleveland on two tests. At the third grade level, Lincoln made the greatest gain in three tests and Emerson in the other. At the fourth grade level, Lincoln made the greatest gain on one test and Cleveland on the other three tests. However, it should be observed that the differences among schools were very small in many instances and were not great enough to be statistically significant.

Considering the greatest gain made by an ability group within each school, the following analysis could be made. Grade levels three and four and the total for three and four (schools) were divided into three ability groups. Four criteria tests are being considered. Therefore, each ability group within each school had 12 chances of making the greatest gain (the third grade had one chance in each of the four tests, the fourth grade one chance in each of the four tests, and the total third and fourth one chance in each of the four tests). At Lincoln there are only eleven chances because of a tie. It can be observed that the greatest gain at Lincoln was made by the top ability group three out of eleven times; the middle group, seven out of eleven times; and the low ability group, two out of eleven times.

At Emerson there are only seven chances because one pre-test was not administered. The greatest gain was made by the top ability group two out of seven times; the middle group, two out of seven times; and the low group, three out of seven times. At Cleveland, the greatest gain was made by the middle ability group one out of twelve times and the low ability group eleven out of twelve times.

Another analysis of the results of these four criteria tests would include the data in Tables XX, XXI, XXII. XXIII, pages 64 to 67. Table XX, for example, contains data for each school, grade level, and ability group for the National Achievement Tests in spelling. The tabulation is based on the ratio of gain/pre-test score. It is difficult to interpret the meaning of these ratios but they do provide another means of comparison. How much gain a student makes depends not only on his pre-test score but also on the limits of the test. How much gain was possible? It can be observed that in each of the Tables XX to XXIII, the biggest ratio exists, for the most part, in the low ability group.

In summarizing the results of these four criteria tests, it can be said that no school did consistently better than the other two schools. It is interesting to note that on two of the criteria tests directly related to the programmed course in spelling (see Tables XVII and XVIII) the Control Group B (Lincoln) made as much or more gain as the two schools which studied the material. However, the differences in gain among schools were not statistically significant. On the other hand, the differences in scores among schools at the beginning of the project were not statistically significant. Yet, each school made statistically significant gains at both grade levels in most ability groups.

TABLE XX

ANALYSIS OF GAIN ON THE NATIONAL ACHIEVEMENT TESTS IN SPELLING

Grade Level	Ability Level	Ratio of Mean Gain to Mean Pre Test Score		
		Lincoln	Emerson	Cleveland
3	1	.95	.56	.55
	2	.95	.61	.64
	3	1.32	.47	.87
	Total	1.15	.60	.67
4	1	.18	.14	.35
	2	.53	.22	.33
	3	.71	.57	1.00
	Total	.39	.27	.48
3 & 4	1	.43	.27	.41
	2	.70	.34	.44
	3	.99	.54	.95
	Total	.64	.36	.54

TABLE XXI

ANALYSIS OF GAIN ON THE TEST ON WORD LIST FROM PROGRAMMED SPELLING COURSE

Grade Level	Ability Level	Ratio of Mean Gain to Mean Pre Test Score		
		Lincoln	Emerson	Cleveland
3	1	.88	.77	.70
	2	.92	.87	.71
	3	1.18	.56	1.15
	Total	.98	.75	.82
4	1	.20	.26	.36
	2	.50	.36	.36
	3	.44	.85	.73
	Total	.35	.44	.45
3 & 4	1	.44	.43	.47
	2	.68	.53	.47
	3	.77	.74	.87
	Total	.59	.54	.57

TABLE XXII

ANALYSIS OF GAIN ON THE TEST ON RULES OF SPELLING

Grade Level	Ability Level	Ratio of Mean Gain to Mean Pre Test Score		
		Lincoln	Emerson	Cleveland
3	1	.52	.44	.61
	2	.70	.46	.73
	3	.70	.31	.95
	Total	.63	.41	.74
4	1	.27	.23	.46
	2	.35	.30	.53
	3	.37	.52	.82
	Total	.32	.34	.57
3 & 4	1	.38	.31	.50
	2	.51	.36	.61
	3	.55	.44	.88
	Total	.47	.36	.64

TABLE XXIII

ANALYSIS OF GAIN ON THE TEST ON WORD LIST TO MEASURE TRANSFER OF SPELLING SKILLS

Grade Level	Ability Level	Ratio of Mean Gain to Mean Pre Test Score		
		Lincoln	Emerson	Cleveland
3	1	.88	.86	.63
	2	.69	.72	.82
	3	.94	.81	1.11
	Total	.82	.80	.83
4	1	.19		.38
	2	.42		.39
	3	.44		.95
	Total	.31		.52
3 & 4	1	.42		.47
	2	.60		.53
	3	.67		1.02
	Total	.52		.62

CHAPTER VII

CONCLUSIONS

The purpose of this research project was to determine the effectiveness of programmed materials and teaching machines in teaching spelling to third and fourth grade pupils. In order to do this, three elementary schools were selected to act as experimental and control groups. The Experimental Group (Cleveland School) used programmed materials and teaching machines; Control Group A (Emerson) used neither programmed materials nor teaching machines but did use the word list from the programmed spelling course as the basis of instruction using conventional methods; Control Group B (Lincoln) used neither programmed materials, teaching machines nor the word list from the programmed spelling course but used the conventional methods and materials used in the other 17 elementary schools not in the research project.

A descriptive analysis of the program was made through the use of teachers' and students' reports and evaluations. An analysis of variance was made for each of two possible variables considered, intelligence scores and spelling achievement scores. Also, an analysis of variance was made for each of the five criteria instruments used in the study. Tests of statistical significance were made to test the gain made by each group. The tests of significance were made on total groups, by grade level, and by ability groups based on intelligence scores.

Following are some of the conclusions reached as a result of this study:

1. Teachers in the experimental group felt that the level of difficulty of the programmed spelling course was for average and above average fourth grade pupils. They felt that it was too difficult for average third grade pupils.
2. Teachers felt that the programmed spelling course was appropriately written, making good use of phonics and repetition.
3. Teachers felt that the mechanics of the programmed spelling course could be improved greatly. The numbering system is difficult for students to follow. Printing frames on both sides of the paper increased the difficulty. The boxes are not strong enough to stand continued use by elementary school pupils.
4. After use for approximately 28 weeks by two sections of third grade pupils and two sections of fourth grade pupils, the programs are no longer usable, even though students wrote their answers on a roll of tape in an Answer-Mate and not on the program.
5. Teachers felt that the teaching machines are cumbersome, difficult to write on, and should be improved from a mechanical viewpoint. The pages of the program frequently are twisted, folded, and torn as they are turned through the machine. Frequently the pages are jammed between the rollers. Teachers felt that they spent more of their time being mechanics than they did in teaching spelling.
6. After use for approximately 28 weeks by two sections each of third and

fourth grade pupils, many of the machines need new rollers before they can be used again. The frames of the machine are durable and usable. The difficulty seems to be with the roller system.

7. Teachers felt that they devoted the majority of their time to fixing machines, helping students place the pages of the program in order, and administering the unit pre- and post-tests. As a result, they had little if any time to devote to giving students individual help in spelling.
8. As a result of the improper functioning of the teaching machines and the difficulty in handling the programmed materials, many of the students and teachers appeared to be somewhat frustrated. This was evidenced especially during the first three to four weeks of the project. It did continue to a lesser degree throughout the project.
9. Despite everything else indicated, the teachers said they enjoyed using the programmed materials and teaching machines, and said that their students enjoyed using them also. They did make recommendations for changes if the program is to be continued.
10. Teachers said that they would like to continue to use programmed materials but in the textbook format, without the use of teaching machines.
11. Teachers said that the motivation of the students was at a high level and that this continued throughout the entire project.
12. Teachers said that some of the students hurried through the program and seemed to be more interested in finishing before their neighbors than in learning spelling.
13. Teachers said that they felt that a carry-over or transfer value was indicated

as a possibility as they noticed that students were able to follow directions better and work independently on other projects.

14. Teachers said that they felt that with the use of programmed materials it was easier to handle make-up work caused by absences.

15. Teachers said that they felt that handwriting did not improve as a result of the students writing on paper on top of the machine. They said that possibly the students' handwriting deteriorated.

16. Some fear had once been expressed in certain quarters that teaching machines would replace teachers. This fear should have been dispelled after this project was completed. It appeared that the teacher's work load was increased considerably as a result of using programmed materials and teaching machines.

17. The differences among schools and grade levels among schools were not statistically significant at the beginning of the project. Each school and grade level and most ability groups within made statistically significant gains. However, only a small amount of differences existed among groups at the conclusion of the study. The differences among schools were not statistically significant.

18. Based on the statistical data reported, it is difficult to say that any method is superior to any other method. It does appear, however, that contrary to statements made by teachers, the low ability group was helped the most at the experimental school and the top and middle ability groups were helped the most at the control school. Students in the Experimental Group made the greatest amount of gain on two of the four achievement tests used.

As a result of this study, the following recommendations are made:

1. That further studies be made relative to the use of programmed materials and teaching machines.
2. That teaching machines not be used with an entire class at lower than the fourth grade level.
3. That use of programmed materials in the textbook format be considered. It appears that the best use of programmed materials might be in the textbook format. This has not been tested in this study but many indications resulting from this study make this recommendation appropriate.
4. That the use of programmed materials and teaching machines be considered on an individual or small group basis as well as on a classroom basis. Different programmed materials could be used at various levels for certain types of students, i. e., the more advanced students who already possess a knowledge of the basic classroom material being studied, the low ability student who needs extra help in skill building or who has missed certain basic skills at an earlier grade level, the student who has been absent and is making up work missed, and the home-bound student who will be at home disabled for a long period of time.
5. That programmed materials be considered as a device for strengthening the curriculum, especially at advance levels. For example, a class of 20 or 25 advanced math students at the high school level might be considered. Assume that five students wish to and are prepared to take calculus, five students wish and are prepared to take analytical geometry, five in statistics and so forth. A sufficient number of students are not available

to offer a class in any of these areas separately. However, through programmed materials, a combined class could be offered to accommodate all math needs. Although programmed materials are costly, this method would be less expensive than offering four or five separate classes to five students each. Perhaps it would be more beneficial to students also. This is only one example. This method could be used in several subjectmatter areas.

6. That as time permits, the following extensions of this study should be made: test students next year for retention, using some of the same spelling tests used in this study; complete an analysis of the results by sex; and determine the coefficient of correlation between intelligence and final spelling achievement. If another study of this type is designed, a test should be made to determine the "novelty effect". This could be accomplished by comparing results of first half and second half testing.

7. That a study be designed to determine if there is carry over or transfer value as indicated by the teachers. Does the use of programmed materials and teaching machines develop confidence in students? Does it provide for further independent study? Does it develop the facility for following directions?

8. That as increased use is made of programmed materials, schedule of students should be examined to control the per cent of time devoted to programmed instruction by each student. Programmed learning (or several methods of programmed learning) consists of learning which is convergent. An attempt should be made to study the effect of increased amounts of

convergent learning and decreased amounts of divergent learning.

9. That as increased use is made of programmed materials a study be made to determine ways to facilitate and take advantage of programmed learning through new techniques of scheduling and school organization.

10. That a study be made to determine which areas can best be served by programmed instruction. Are there certain basic instructional routines which can be handled better than others? Are there routines a program can develop better than the teacher?

11. That various types of research studies be continued and initiated in the local school system. Research studies which are designed and controlled appropriately tend to motivate students and teachers alike. Proposed studies should be screened. It is suggested that most proposed studies which are accepted for research will result in a great amount of professional improvement among staff members.

BIBLIOGRAPHY

BOOKS

Hilgard, Ernest R. "What Support from the Psychology of Learning?" NEA Journal. Washington: National Education Association, 1961. Vol. 50, No. 8.

Lumsdaine, A. A. and Robert Glaser. Teaching Machines and Programmed Learning. Washington: National Education Association, 1960.

National Education Association. Teaching Machines and Programmed Learning. A Glossary Prepared by the Staff of the Nea Journal. Washington: National Education Association, 1961.

National Education Association. Teaching Machines and Programed Instruction: An Introduction for Students and Their Parents. A Report Prepared by the Staff of the National Education Association.

Troemel, Roland. "What Research Shows About Programmed Learning and Remedial Readers," SDEA Journal, 1963. Vol. 38, No. 4.

TESTS

Lorge-Thorndike Intelligence Test. Houghton-Mifflin

National Achievement Tests in Spelling. Acorn Publishing Company. 1961.

Test on Rules of Spelling. Grolier. 1962.

Test on Word List from Programmed Spelling Course. Grolier. 1962

Test on Word List to Measure Transfer of Spelling Skills. South Dakota: Curriculum Department, Sioux Falls Public Schools, 1962.

Torrance, E. Paul. How I Like School. Minnesota: University of Minnesota, Bureau of Educational Research. 1961.

APPENDIX

APPENDIX A

RELIABILITY OF SPELLING TEST

An approximation formula for the Kuder Richardson reliability[1]

$$r_{tt} = \frac{n\sigma^2_t - \overline{R}\,\overline{W}}{(n-1)\,\sigma^2_t}$$

Where $\overline{R}$ = average number of right responses

$\overline{W}$ = average number of wrong responses

n = number of items in test

σ^2_t = square of standard deviation

M = mean

$$r_{tt} = \frac{n\sigma^2_t - M(n-M)}{(n-1)\,\sigma^2_t}$$

$$= \frac{40\,(6.36)^2 - 26.67\,(40 - 26.67)}{(40-1)\,(6.36)^2}$$

$$= \frac{1262.49}{1577.55}$$

$$= 0.800$$

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[1] Guilford, J. P., Fundamental Statistics in Psychology and Education, McGraw - Hill Book Co., Inc., New York, 1956.

APPENDIX B

PRE TESTING SCHEDULE

SPELLING EXPERIMENT - GRADES 3 & 4

Control Schools: Emerson and Lincoln

Experimental School: Cleveland

EVALUATION SCHEDULE

NAME OF INSTRUMENT	GROUP TO BE TESTED	BY WHOM	WHEN
Large Thorndike IQ (Form 2 AP)	Grade 3 only	R. Troemel	Sept. 6 & 7
Large Thorndike IQ	Grade 4 only	Classroom Teacher	7th week Regular testing program
National Achievement Tests (Spelling)	Grades 3 & 4	Classroom Teacher	Before Sept. 17
Test on Word List from Programmed Spelling Course	Grades 3 & 4	Classroom Teacher	Before Sept. 17
How I Like School	Grades 3 & 4	Classroom Teacher	Before Sept. 17
Teacher's Anecdotal Record	Grades 3 & 4 (Experimental School only)	Classroom Teacher	From Sept. 17 to completion of experiment
Students' Time Logs and Commentary	Grades 3 & 4 (Experimental School only)	Students (Cleveland only)	From Sept. 17 to completion of experiment

APPENDIX C

POST TESTING SCHEDULE

1. Test all 3rd and 4th grade children in control and experimental groups at Cleveland, Emerson and Lincoln.

2. Test the entire class (section) at Emerson and Lincoln in one group (one group for each classroom or teacher). Test during the week of March 11.

3. At Cleveland test students as they finish the program, except that small groups can be accumulated to be tested approximately every week.

4. Because of the length of the tests, each of the spelling tests should be administered in two sessions.

Tests	Items	Remarks
1. Standardized Spelling Test (National Achievement Tests)	50	Divide into two sessions
2. Spelling List of Words from Programmed Course	40	Divide into two sessions
3. Spelling List of Transfer Words	40	Divide into two sessions
4. Post Test on Programmed Course	69	One session
5. How I Like School Inventory	50	One session
Other Instruments		
6. Students' Time Logs and Commentaries		Send to Dr. O'Hare prior to June 3, 1963
7. Teacher's Anecdotal Record Booklet		Send to Dr. O'Hare prior to June 3, 1963
8. Teacher's Evaluation Sheet		Send to Dr. O'Hare prior to June 3, 1963

APPENDIX D

NATIONAL ACHIEVEMENT SPELLING TEST

Directions: Distribute an answer sheet to each pupil. Pronounce each word distinctly, at least twice. The word may be used in a sentence for an example.

Administer test in two sections, twenty five words each. Do not allow any change to be made in the first twenty five words during the administration of the second half of the test.

This test generally requires about 25 minutes. There is no time limit.

Make sure that each pupil has a sharpened pencil.

Read the directions and sample to the class, reading the sample as follows: "Good ----- Henry is a good boy ----- Good."

Use the words and sentences listed on this form. For each question, read the number of the question to the class, the word to be spelled, the complete sentence, and, finally, repeat the word to be spelled.

Pronounce words distinctly, but without unnatural emphasis that might give pupils any hint as to the correct spelling. Allow enough time for every pupil to write the word required in one sentence, before beginning to read the next question.

When the test is finished, tell the pupils to make sure their names are on their test papers, and collect the tests promptly.

APPENDIX D

NATIONAL ACHIEVEMENT SPELLING TEST

SPELLING TEST
(For Grades 3 and 4)

SCORE _____

NAME _____ Name of School _____ Grade _____

AGE: Years ___ Months ___ GRADE ___ CITY _____ STATE ___ Date ___

DIRECTIONS: BELOW, there are 50 sentences. In each sentence, one word has been left out. You will be told the word which has been left out. Listen carefully. Then, for each sentence, put the word on the line.

SAMPLE: Henry is a __(good)__ boy.

1. You were _____ for school.
2. My little _____ is at home.
3. We shall _____ a good time.
4. You must _____ at once.
5. Let us _____ to another house.
6. You may _____ the book.
7. There is no _____ to drink.
8. I shall _____ a letter.
9. Let me _____ the ball.
10. He is _____ in the world.
11. There's a _____ in my stocking.
12. Have you _____ your face?
13. Tell us _____ what he said.
14. He found _____ in his work.
15. She was _____ for three days.
16. He was _____ down the street.
17. There are _____ here.
18. The bird _____ away.
19. Every _____ we rest.
20. He is a _____ man.
21. Buy some _____ at the store.
22. We could _____ the flowers.
23. She was _____ a book.
24. What is the _____ of the hat?
25. He is _____ to go home.
26. He is a _____ of mine.
27. Eat some _____ every day.
28. He is _____ a good boy.
29. Tell the _____ she is sick.
30. I am _____ to help you.
31. Bread is _____ to make.
32. Will you _____ the mistake?
33. Where did you _____ to sing?
34. Tell us the _____ truth.
35. Let us _____ our work.
36. He is _____ in the house.
37. I found a _____ in the city.
38. Ask the ___ to clean your teeth.
39. She is _____ years old.
40. He has an _____ in the city.
41. Give him a _____ of bread.
42. Do not _____ this paper.
43. He is _____ years old.
44. We had a _____ time.
45. Do you _____ him to go?
46. Did you _____ my letter?
47. He has no _____ to get rich.
48. I shall _____ you, if I can.
49. He gets a _____ every week.
50. I have not _____ you.

(GO ON TO NEXT COLUMN)

(END OF TEST. LOOK OVER WORK)

NUMBER RIGHT _____

APPENDIX E

SPELLING TEST OF SELECTED WORDS FROM PROGRAMMED SPELLING COURSE

1. consonant
2. airplane
3. set
4. not
5. site
6. feed
7. small
8. wrote
9. store
10. base
11. there
12. cry
13. five
14. knife
15. birth
16. March
17. angry
18. eleventh
19. warm
20. funny
21. together
22. watching
23. world
24. night
25. robust
26. assist
27. fiction
28. remain
29. street
30. business
31. pretty
32. forward
33. finger
34. definition
35. bread
36. rare
37. butter
38. harvest
39. raisins
40. copper

APPENDIX F

SPELLING LIST OF SELECTED WORDS TO TEST FOR TRANSFER OF SPELLING SKILLS

1. remember
2. baseball
3. get
4. yes
5. kite
6. keep
7. light
8. writing
9. horse
10. rare
11. their
12. fly
13. nine
14. known
15. birthday
16. April
17. hungry
18. fifth
19. world
20. happy
21. remember
22. bashful
23. color
24. light
25. shallow
26. practice
27. protection
28. lightning
29. sweep
30. popular
31. rabbit
32. forget
33. lesson
34. dictionary
35. ahead
36. mule
37. letter
38. thunder
39. wealthy
40. gallon

APPENDIX G

TEST ON RULES OF SPELLING

Name _____ Grade _____

School _____ Teacher _____

PRE- AND POST-TEST

1. The five vowels are: ___ ___ ___ ___ ___.
2. All the letters of the alphabet which are not vowels are: _____.
3. The name of the letter E, as in weep, sounds like _____ e.
4. The name of the letter A, as in tape, sounds like _____ a.
5. Feed has the _____ vowel sound.
6. Meet has the _____ vowel sound.
7. Met has the _____ vowel sound.
8. Long e sounds like the name of the letter ___.
9. The long o sound is the same as the name of the letter ___.
10. Set, Feel: Which word has the short e sound? _____.
11. Rid, Ride: Which word has the short vowel sound? _____.
12. Cap, Cape: The e changes the vowel _____ from short to long.
13. An e added to words changes the vowel sound from _____ to _____.
14. Cut, Cute: Which word has the short u sound? _____.
15. Top, Close: Which word has the long o sound? _____.
16. An e added to words changes the _____ sound from short to long.
17. Tell has the _____ _____ sound.
18. Three ways to make the long e sound are:

    1. _____ 2. _____ 3. _____

APPENDIX G

19. Four ways to spell the long o sound are:

    1. _____ 2. _____ 3. _____ 4. _____

20. Peal, peep, and geese are alike in that they have the _____ e _____.

21. Mine has the _____ _____ sound.

22. Three ways to spell the long I sound are:

    1. _____ 2. _____ 3. _____

23. Knife has the _____ _____ sound.

24. Hat has the _____ _____ sound.

25. Bet has the _____ _____ sound.

26. Three ways to spell the long a sound are:

    1. _____ 2. _____ 3. _____

27. Store has the _____ _____ sound.

28. Aid has the _____ _____ sound.

29. Jump has the _____ _____ sound.

30. Maid has the _____ _____ sound.

31. The sound shun is often spelled _____.

32. Some words have the uf sound spelled _____.

33. The y in minute has the _____ _____ sound.

34. Feel has the _____ _____ _____.

35. When q appears in a word, it is always followed by ___.

36. Too means _____.

37. Two means _____.

38. Long o sounds like the name of the letter ___.

APPENDIX G

39. The k is silent in words that begin with ___.

40. The _____ _____ sound is spelled eau in the word beautiful.

41. Often the s sound is spelled ___ when it comes before ___.

42. In the dictionary, A is before B in _____ order.

43. Ā means that the sound is _____ _____.

44. Long a sounds like the name of the letter _____.

45. To add ing to words ending in e, _____.

46. Words can be broken into parts called _____.

47. Each syllable has a _____ sound.

48. To add ed to words ending in e, _____.

49. Raced in the _____ _____ of Race.

50. The z sound is often spelled _____ when it comes before e.

51. The symbol " ‿ " over a vowel means that the sound of the vowel is _____.

52. An _____ is a short way of writing a word.

53. The w is _____ in words which begin with wr.

54. There are as many syllables in a word as there are _____ _____.

55. When the s sound comes before e, I, or y, it is often spelled _____.

56. To add ed to one-syllable words with a short vowel, _____.

57. In the dictionary, when words have the same letter at the beginning, they are put in the order of their _____ letter.

58. Write the word tune and show that it has the long u sound: _____.

59. Long I sounds like the name of the letter _____.

60. The word investigate has _____ syllables.

APPENDIX G

61. If a word has five vowel sounds, how many syllables can it be broken into? _____

62. There is usually an _____ at the end of plural words.

63. Words ending in ____, ____, ____, ____, and ____ form their plurals by adding es.

64. To form the plural of words ending in y preceded by a vowel, add _____.

65. To form the plural of words ending in y preceded by a consonant, _____.

66. When two words are made into one by use of an apostrophe, the new word is called a _____.

67. When the ch sound follows a short vowel, it is often spelled _____.

68. Words which do not obey the rule stated in question 67 are: _____, _____, _____, _____, and _____.

69. When spelling a word whose sound is long e, the rule is _____.

APPENDIX H

Bureau of Educational Research University of Minnesota

The questions on this sheet ask you to tell what you like or do not like about school. Please answer them by making a circle around the YES or NO for each question. Do not stop long to think about any one question. If any one seems hard, go on to the next questions and come back to it later. There are no right or wrong answers here. The answer you mark should tell just how you feel or think about the question.

What is your name?_____

Are you a boy or a girl?_____ How old are you? _____ What is your grade? _____

Name of your school_____ Name of your teacher_____

1. Is most school work interesting?
   Yes No
2. Do you feel important in school?
   Yes No
3. Do you feel you lost out if you miss school?
   Yes No
4. Do you like school?
   Yes No
5. Do you think your teacher likes the games you play?
   Yes No
6. Are you often unhappy in school?
   Yes No
7. Are you sometimes permitted to help others with their work?
   Yes No
8. When things are funny, does your teacher laugh also?
   Yes No
9. Is your teacher usually kind to you?
   Yes No
10. Is it easy for you to get help in school?
    Yes No
11. Are pupils often made to stay in for recess or after school?
    Yes No
12. Do most children in your room try to understand before they ask questions?
    Yes No
13. Do you like school most days?
    Yes No
14. Are you praised when you do good work?
    Yes No
15. Are you scolded when you do not know something?
    Yes No
16. Is the whole class often punished when only one or two pupils are to blame?
    Yes No
17. Is your school room a happy place?
    Yes No
18. Is most school work explained so you can understand?
    Yes No
19. Are the children in your room nearly always treated fairly?
    Yes No
20. Are the children in your room allowed to ask questions?
    Yes No

(Go ahead to more questions on the other side of this sheet.)

APPENDIX H

21. Do most children in your room like to stay away from school?
Yes No

22. Does your teacher keep her promises?
Yes No

23. Do you like school very much?
Yes No

24. Do you like to stay out of school?
Yes No

25. Do you think your teacher likes you?
Yes No

26. Does it seem that you always do poor work?
Yes No

27. Do you get help when you do not know something?
Yes No

28. Do you often have too much homework?
Yes No

29. Do you enjoy school?
Yes No

30. Are you proud to be in your school group?
Yes No

31. Do you like your teacher?
Yes No

32. Are you invited to ask questions?
Yes No

33. Do you like to talk to your teacher alone?
Yes No

34. Are you afraid to ask questions?
Yes No

35. Are most school days happy ones for you?
Yes No

36. Are pupils punished in front of others?
Yes No

37. Do you sometimes talk and joke with your teacher?
Yes No

38. Are you often scolded in school?
Yes No

39. Are you told when you do good work?
Yes No

40. Do you help decide what the class does?
Yes No

41. Are you often bossed in school?
Yes No

42. Are your lessons explained well?
Yes No

43. Are the children scolded often?
Yes No

44. Are you scolded for mistakes in your work?
Yes No

45. Is there always something wrong with your work?
Yes No

46. Does your teacher seem to like children?
Yes No

47. Are you afraid to ask for help?
Yes No

48. Do you hate school?
Yes No

49. Do most children in your room get the help they need?
Yes No

50. Do you feel you are treated fairly in school?
Yes No

APPENDIX I

TEACHER EVALUATION FORM

TO TEACHERS OF PROGRAMMED INSTRUCTION COURSES:

Enclosed with this material for finalizing your course in programmed instruction you will find a "Teacher Evaluation Form". It is suggested that you read it carefully and consider your answers thoroughly before filling in the form. The answers which you give will be made a part of the final research report in this experiment and will bear directly on the reported results.

Thank you,

Robert W. O'Hare
Administrative Assistant

APPENDIX I

TEACHER EVALUATION FORM

Title of Program _____ Name of Teacher _____

The following questions were designed to help us evaluate the program that you have just gone through with your class. The information that you can furnish will be of great value to us. For each question please check the blank that you feel most adequately describes your opinion. Blank lines have been provided below each question for you to qualify or elaborate on your answers. Please feel free to make any comments that will aid us in determining the value of this program.

Is the subject-matter of the program academically sound?

_____ Yes _____ No _____ Undecided

Comments: _____

_____

_____

Was the level of the subject matter appropriate for your class?

_____ Too difficult _____ Appropriate _____ Too easy

Comments: _____

_____

_____

As contrasted with what you have been able to accomplish with other types of learning material, how much do you feel you were able to get your pupils to learn with this program?

_____ A great deal more than with most other materials.

_____ A little more than with most other materials.

_____ About as much as with other materials.

_____ A little less than with most other materials.

_____ So little as to be a waste of time.

Comments: _____

_____

_____

APPENDIX I

The next time you teach a course in this subject or a similar field, would you

_____ Prefer to have programs used for at least part of the course?

_____ Prefer not to have programs used?

_____ Not care whether programs are used or not?

Comments: _____

_____

_____

To what extent did you enjoy using this program with your class?

_____	_____	_____	_____	_____
Very Unenjoyable	Unenjoyable	50 - 50	Enjoyable	Very Enjoyable

Comments: _____

_____

_____

Do you think this program should be made available for the use of teachers throughout the country?

_____ Yes _____ No _____ Don't know

Comments: _____

_____

_____

In your own words would you please summarize your opinion of this program. Include statements about its strong and weak points.

APPENDIX I

TEACHER EVALUATION FORM

SIOUX FALLS PUBLIC SCHOOLS
E. W. Skarda, Superintendent

Spring, 1963

TEACHERS' EVALUATION SHEET: PROGRAMMED SPELLING COURSE

School_____ Grade_____ Teacher_____

Directions: Teachers at Cleveland should answer all of the following questions. Teachers at Emerson and Lincoln should answer questions number 1, 2, and 3. Please return to Dr. O'Hare before June 3, 1963.

1. Have you assigned homework in spelling to your pupils any time this year?
Yes _____ No _____.

2. If you have assigned homework in spelling, please estimate the average daily amount of time the average student would have to work to complete the assignment. (If you did not make the assignments daily please determine the amount of time per week and then divide by five to give us a daily average.

_____

3. On the average, how much time (excluding one and two above) did your class devote to spelling daily? _____

4. Please give your personal evaluation of the programmed materials and teaching machines. We do not want to structure this question too highly but please consider your answer from as many viewpoints as possible. Discuss advantages and disadvantages. Would you recommend continued use of these materials? If so, under what conditions? The answer to this question is very important and we trust that you will give it your serious consideration. Add as many sheets of paper to this one as you need to complete the answer to this question.

_____

_____

_____

_____

_____

_____

Dr. Robert W. O'Hare

APPENDIX J

STUDENT TIME LOG

Name _____
(last) (first)

School _____

STUDENT DAILY TIME LOG

DATE	UNIT - COMPLETED PROBLEMS	Class Periods	Test Score
Sept. 11	I 1 - 60	1	
Sept. 12	I 61 -100	1	
Sept. 13	I 101 - 113	1/2	
	Unit 1 Test	1/2	12 out of 20
Sept. 14	II 1 - 35	1	
Sept. 17	Absent	0	
Sept. 18	No class (assembly	0	
Sept. 19	II 36 - 85	1	

APPENDIX K

STUDENT EVALUATION FORM

1. If spelling machines had not been used in spelling class, I believe:

   ____ I would have learned less in spelling.

   ____ It would have made no difference.

   ____ I would have learned more in spelling.

2. In comparing work done using the spelling machines with studying in the textbook, I feel that, with the same amount of time and effort:

   ____ I learn much more with the machines.

   ____ I learn somewhat more with the machines.

   ____ I feel there is no difference.

   ____ I learn somewhat more from studying textbooks.

   ____ I learn much more from studying textbooks.

3. If I were to take another course in this subject or a similar subject, I would:

   ____ choose to have machines used for at least part of the course.

   ____ choose not to have machines used.

   ____ not care whether machines are used or not.

4. How much do you think you learned from using the spelling machines?

Learned nothing	Learned a little	Learned a medium amount	Learned quite a bit	Learned very much

5. How much did you enjoy going through this program using the spelling machines?

Very much disliked	Disliked	Don't know	Enjoyable	Very enjoyable

6. In your own words say what you thought of the spelling machines. For example, what did you like about the program? What didn't you like about it, etc.?

APPENDIX L

WORD LIST FROM PROGRAMMED MATERIALS

vowel	tube	store	Sunday	April
bridge	hid	yet	sun	September
cross	hurry	seven	globe	October
road	quickly	fish	round	frozen
across	changes	animal	please	more
letter	Christmas	broke	season	hungry
every	December	sit	core	feet
afraid	train	brake	apple	begin
again	rip	tiny	middle	angry
consonant	bite	store	five	rabbit
alphabet	mule	pieces	trapper	hatch
brave	close	stop	trap	tune
front	week	signal	wild	happy
head	each	spring	dam	yesterday
ahead	led	begin	jet	Friday
before	yes	grow	powered	Saturday
very	opposite	cry	them	May
needs	desk	ring	here	huge
plane	number	ball	winter	November
airplane	feed	base	knife	eleventh
wings	three	baseball	cutting	fried
fly	between	team	March	hide

APPENDIX L

long	drop	play	June	August
short	lake	players	space	sight
lined	far	month	funny	July
under	near	year	February	busy
smoke	lesson	popular	guide	smile
protection	tough	were	bright	wrote
chimney	frame	milk	turns	surprise
flag	picture	pharmacy	which	attack
blue	wealthy	photograph	horse	pleasant
keep	help	forget	colt	skate
camper	thunder	remember	young	hammer
watching	assist	business	definition	harvest
circus	clay	climb	difficult	abbreviation
built	people	ladder	question	dictionary
popcorn	indians	school	answer	success
lawn	pound	double	equal	dance
met	purple	toes	quart	column
long	bowls	enemy	divide	author
lunch	twelve	foe	multiply	autumn
earth	January	near	quarter	population
wait	color	made	evening	practice
world	fiction	pretty	bread	raisins
four	imaginary	price	bashful	excellent

APPENDIX L

east	twelve	thing	shy	eagle
direction	hour	clothing	smooth	umbrella
correction	minute	shine	beautiful	ounce
error	sixth	bushel	coin	surface
plain	ninety	peck	camera	plural
under	seventy	Washington	roof	solitude
understood	valley	president	salute	precede
morning	canyon	capital	known	diamond
underlined	heavy	time	napping	summer
feed	light	clock	days	hold
sweep	large	their	cakes	syllable
set	small	there	birth	warm
met	protection	snow	birthday	mail
ride	water	ground	kill	ice
rid	tooth	child	insects	office
mat	brush	children	fix	rain
except	clean	fire	man	dark
day	cleaning	dress	pair	clouds
Wednesday	teeth	weep	repairman	sky
Tuesday	pop	seek	television	laughed
tomorrow	night	hunt	vision	clown
name	incorrect	carrot	purchase	straight

APPENDIX L

town	wrong	vegetable	door	shallow
hundred	uncle	beets	house	buffalo
red	ants	tables	float	quite
dollar	aunt	early	boat	scarce
white	lightning	telephone	about	ocean
American	enough	talk	journey	comb
swim	rough	often	brook	breakfast
guards	strong	mountain	stream	circle
together	robust	street	finger	butter
group	fifth	listen	soft	pronounce
chance	arithmetic	person	wheel	gallon
remain	forward	rare	copper	night

APPENDIX M

LETTER TO PARENTS AND INFORMATION ON TEACHING MACHINES AND PROGRAMMED INSTRUCTION

CLEVELAND SCHOOL

September 27, 1962

Dear Parents:

The purpose of this letter is to inform parents that their child will be studying spelling this year in a somewhat different manner than in previous years.

Attached to this letter is a bulletin discussing teaching machines and programmed learning. It has been prepared by The Center for Programmed Instruction Inc., in New York City.

Your child is in a class in which programmed materials and teaching machines will be used during the coming school year. The purpose of the attached bulletin is to give you an understanding of programmed materials and teaching machines.

The programmed materials and teaching machines will be used approximately twenty (20) minutes per day for the instruction of spelling. Students will be tested at regular intervals to assure that the material is being learned in an effective manner.

If you should have any questions regarding this special instruction, please feel free to contact your child's classroom teacher, Dr. O'Hare in the Superintendent's Office, or myself.

The above mentioned program pertains to the rooms of which Mrs. Bryant, Mrs. Gunderson, Mrs. Hegstrum and Mrs. Mayforth are the teachers.

Sincerely,

H. L. Svendsen, Principal

APPENDIX M

LETTER TO PARENTS AND INFORMATION ON TEACHING MACHINES AND PROGRAMMED INSTRUCTION

A PARENTS GUIDE TO TEACHING MACHINES AND PROGRAMED INSTRUCTION

Prepared and Published by The
Information Division of
THE CENTER FOR PROGRAMED INSTRUCTION, INC.

Purpose of the pamphlet:

This pamphlet is intended to help parents interested in utilizing teaching machines and/or programed instructional materials to further their children's education. Most parents have read about teaching machines and programs in magazines or newspapers. The effect of instruction by means of these devices is often impressive, and parents are interested in their possibilities for home study. In addition, many programs and teaching machines are being "offered for sale" in supermarkets, by door to door salesmen, and elsewhere by direct mail, newspaper and magazine advertising. The huge number of requests for information and advice received by the Center indicates that many parents are interested in using these materials and would like guidance as to which programs would be appropriate and for what purposes. It is hoped that this pamphlet will help solve some of the problems which you, the parent, will face.

What is a "program" of instruction?

A "program", as a glossary term for a specialized means of instruction, is a sequence of carefully constructed items or frames leading the student to mastery of a subject with a minimal error. Information is given to the student in small units to which he responds in some way--by completing a sentence, working a problem, or answering a question, and at each step he receives immediate confirmation of his response. Items are designed so that the student can make correct responses while progressing toward more and more complex material and ultimately building the conceptual framework of a subject area. The principles of programing come to us from basic psychological research dealing with the learning process. The "program" should be thought of as a more efficient and effective book, always enhanced by the implementation of a good teacher--and not another "plan" or audio-visual "gimmick."

Is A Teaching Machine Necessary?

A teaching machine has been likened to the binding of a book. Therefore, if a child learns anything, he will learn as a result of the material in a teaching machine (i. e. the program) rather than a result of the teaching machine itself. The machine in actuality has very little to do with the process, and is in many cases unnecessary. Most programs

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which can be presented by teaching machines can also be presented in a special type of book. Over 90% of the programs presently available for use are published as programed textbooks.

The evidence compiled to date seems to indicate that there is essentially no difference in the learning that takes place between the presentation of a program in a teaching machine and its presentation in a programed textbook. Seven independent research studies have shown no differences between those two methods of presenting a program. Hence, the important thing to get for the child is the program and not necessarily the teaching machine. An up-to-date compendium, with pictures, of available teaching machines may be found in the Finn-Perrin, Teaching Machines and Programed Learning, 1962: A Survey of the Industry. This publication is available from the National Education Association, Washington, D. C.

The Effectiveness of Programed Instruction:

Several experiments using programs have reported very impressive results. There is no doubt that many students can learn a great deal independently with good programs. Unfortunately, not all programs are of equal quality, and there are programs in existence which have not been able to teach anybody anything. It is also unfortunate that several of the producers of teaching machines and programs have resorted to deceptive, sensational advertising. In some cases, advertisements have described very effective, impressive results obtained with a program, and this is accurate, but the situation which produced these results was one which did not even utilize the programs or teaching machines which are being offered by the advertisement.

Thus some producers are giving the impression that it was their material which produced these results when in point of fact it may have been the material of another company. In some instances, producers have gone so far as to inaccurately or incompletely report the effect of a program, and as a result make it look much better than it is.

Even if one has a good quality program, this does not necessarily mean that all children will learn from it. There are, unfortunately, some children who have difficulty learning in school. In addition, most of the programs available today require the student to read. Children who have serious reading difficulties probably will not even be able to read through the program. Programed instruction does not promise miracles, contrary to what some producers seem to be claiming. In general, we have found that success on a program is highly correlated with school success and intelligence. This means that children who do well in school will tend to learn more from a program than students who are not doing as well. Programs can help, in many cases a great deal, but education of a child is a complicated process involving hundreds of problems, and programed instruction like anything else cannot solve all of these in one moment.

Use of Programed Instruction:

Programed instruction is being used by many schools throughout the country to help in the extremely important job of educating our children. Research evidence so far shows that

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children can learn from programs just as effectively at home in an "unsupervised situation" as they can at school. Naturally, programs do not teach all of the things that are important for our children to learn, and a great deal of school time is required for this, but the experimental evidence gathered to date on the use of programs in the home is very encouraging. It seems feasible and sensible to enrich a child's education through experience with programs at home. In some cases programs may be used with the intention of helping a boy or girl who is slightly behind in his work to "catch up." In other cases, programs may be used with youngsters who are doing well in school to help further their education.

The Availability of Programs:

Programs are available from many sources. The most common sources that the parent would come into contact with would be the door to door salesman, the supermarket, and periodical and newspaper advertising. Many, if not most of the programs which are being used in schools are available through the typical producers of instructional materials. In general, these organizations do not place newspaper advertising, market their products through supermarkets, or have a force of door to door salesmen.

Do not necessarily purchase the first program or machine which is offered to you. Programs vary in quality, some being very good and others being extremely poor. One must exercise as much care in the purchasing of programs as one would in the purchasing of food in a supermarket. While some foods are very palatable, others are only digestible, and some will cause trouble. There are several steps we would recommend before purchasing a program or a teaching machine.

Suggested Steps for Parents:

If a salesman has approached you with respect to buying a particular program, or you are interested in a program because you have seen it in a bookstore or supermarket or read an advertisement, we would suggest that you write down the name of the program and the publisher and take it along with this leaflet to your child's teacher or guidance counselor. The professional school personnel can look up the program in Programs '62: A Guide to Programed Instructional Materials published by the U. S. Office of Education and check to see whether or not the program you are considering teaches material similar to what your child is learning in school. In the United States each school system determines to a great extent its own curriculum. Not all school systems teach the same thing and the approaches to different subjects may vary considerably from school to school. It is extremely important that the content and approach of the program you are considering are consistent with the objectives of the school that your child attends.

Two contradictory approaches (one in school and the other at home with a program) can confuse your child, and, rather than help him, you may hinder his efforts. For example, a science program for the fifth grade may teach all about the human body. The school, on the other hand, might be teaching their fifth graders all about atomic structure and both might have the labels of "fifth-grade science." Your child's teacher or guidance counselor

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is in the best position to know whether or not the particular program you are interested in may help your youngster, for they know the objectives of the school.

If you are interested in using programs of instruction for your children, but have not seen any programs in particular, consult the school personnel and ask them to look in the Guide to Programed Instructional Materials and recommend a program which teaches the kind of thing that would be helpful for your child. Then you may obtain the program from the publisher directly.

There is always the possibility at this time that there is no program for your child's grade level in a particular subject. More programs are being written every day, and hopefully, one will soon become available. A program of high quality, which is consistent with the approach and content which your child is learning in school, can make a valuable contribution to his education for the challenging years which lie ahead.

Questions to ask:

1. What does this program teach?
2. How do I use it?
3. How long should my child work at one time?
4. Should he enlist outside help?
5. How do I know what he is learning or how well he is doing?

The Center for Programed Instruction, Inc., a non-profit, educational organization, was established in December of 1960, with the help of a grant from the Carnegie Corporation of New York. It is dedicated to the research and development of the principles of programing as well as the collection and dissemination of information concerning the utilization of programed instructional materials. The major objective of the Center is to translate research findings into practical classroom application, primarily at the elementary and secondary levels.

APPENDIX N

INFORMATION RELATIVE TO TEACHERS' PARTICIPATION IN EXPERIMENTAL GROUP

SPELLING - PROGRAMMED LEARNING AND TEACHING MACHINES

I. Motivation

A. Positive -- which type? (more able, low intelligence, personality type? works on own initiative or needs to be encouraged)

B. Negative -- which type? (more able, low intelligence, personality type?)

II. Behavioral characteristics

A. Calm and relaxed or nervous and anxious (How does reaction here compare with regular reaction?)
B. Persistent or gives up easily
C. Sincere or racing through just to finish
D. Depressed
E. Cooperative or negative-fearful
F. Overactive or underactive
G. Attention
   1. Concentrated, absorbed by the task
   2. Normal attention to outside distractions and returns to task
   3. Easily distracted
   4. Day-dreams
   5. Difficult to hold attention for more than a few seconds

III. Causes of errors

A. Lack of phonetic sense
B. Poor visualization
C. Faulty enunciation and pronunciation
D. Inability to apply word-attack principles such as
   1. syllabication
   2. final e
   3. double vowels
E. Careless handwriting
F. Intelligence
G. Faulty study procedure
H. Low reading ability
I. Handwriting

APPENDIX N

IV. Evidence of progress in spelling

- A. Use of dictionary for spelling
- B. Carryover into other composition
- C. Proofreading practiced
- D. Effective study habits

V. Actual comments made by pupils

APPENDIX O

INSTRUCTIONS TO STUDENTS REGARDING THE USE OF PROGRAMMED MATERIALS AND TEACHING MACHINES

1. Avoid bending corners or folding program sheet.

2. Before inserting unit into machine double check to be sure pages are in proper order.

3. Insert only one unit at a time.

4. Remember to turn unit over after finishing the front side.

5. Keep check on frame numbers so that two sheets don't creep through.

6. Be sure the last sheet is completely through the machine before inserting new unit.

7. Close top before removing a unit from machine. The top will have to be lifted slightly to let the sheets come out. (With the top open the hinges may rip loose.)

8. Use both hands when opening and closing top.

9. Be careful about turning too far and overshooting frame. You can't back it up!

10. At the beginning of the period take five minutes or so to review what you covered the day before.

11. Be careful about speeding too fast!! Think about what you are learning.

12. REMEMBER YOU ARE NOT COMPETING WITH YOUR NEIGHBOR. DON'T TRY TO KEEP UP WITH HIM -- KEEP UP WITH YOURSELF.

DON'T FORGET TO MAKE OUT THE STUDENT'S DAILY LOG !!!

(Leave the log sheet in your machine when you leave.)

APPENDIX P

MATERIALS DEVELOPED BY TEACHERS AND CONSULTANTS FOR USE IN GROUP A

Lesson I

led	near	boat	Monday	pieces
sit	road	week	Tuesday	autumn
rid	deeds	train	Wednesday	Friday
hid	sun	jet	Thursday	Saturday
				Sunday

Child choice for extra words.

Lesson II

yes	yet	set	pick	met
red	desk	brave	plane	tube
mule	close	hide	September	August
bite	multiply	Indians	raisins	beautiful
				which

Child choice for extra words.

Lesson III

mat	trap	apple	dam	flag
camp	dance	play	clay	day
skate	frame	wait	mail	rain
trapper	camper	player	straight	American

Lesson IV

Review the words most difficult for children

cross	across	long	drop	clock
pop	breakfast	carrot	vegetable	butter
				buffalo

Lesson V

base	space	brake	broke	lake
huge	frame	shine	price	made
smile	guide	ride	name	white
ice	cakes	rare	scarce	ball
baseball				

Activity: Build compound words from spelling list example: spaceman

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Lesson VI

seek	sweep	beets	feed	wheel
feet	keep	teeth	weep	dollar
excellent	gallon	cutting	happy	funny
copper	letter	man	pail	repairman
				pheasant

Lesson VII

clown	town	vowel	powered	bowls
known	tomorrow	snow	shallow	grow
about	house	pound	round	ground
hour	ounce	pronounce	clouds	enough
rough	tough			

Lesson VIII

seven	fish	spring	ring	thing
month	them	winter	hatch	long
milk	kill	fix	lunch	help
soft	October	sixty	ninety	seventy
				salute

Lesson IX

again	before	globe	each	between
team	please	season	here	smoke
east	plain	diamond	clean	cleaning
straight	fire.	shy	colt	

Review days of the week.

Lesson X

hurry	middle	ladder	hammer	excellent
attack	umbrella	dollar	incorrect	success
lesson	summer	error	assist	difficult
under	underlined	understood	September	October
November	hunt	time	dress	

Lesson XI

care	store	horse	door	more
morning	short	fly	far	May
ice	fifth	eleventh	author	pharmacy
heavy	built	earth	world	there
				were

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Lesson XII

fried	laughed	lined	napping	watching
chimney	valley	rabbit	animal	Aunt
ants	days	cakes	tables	wings
turns	toes	insects	guards	houses

Lesson XIII

people	purple	eagle	uncle	circle
bread	head	ahead	very	cry
year	tune	tiny	syllable	busy
blue	sky	four	twelve	three
				five

Lesson XIV

tooth	brush	comb	water	robust
strong	child	children	finger	vision
pretty	float	stream	Christmas	December
sight	light	night	bright	straight

Lesson XV

mountain	canyon	lawn	thunder	surface
solitude	smooth	brook	small	large
lightning	bridge	January	swim	journey
warm	ocean	begin		

Lesson XVI

often	dark	wrong	early	quickly
imaginary	bashful	young	popular	wealthy
rare	quite	May	August	September
		October	November	December

Review months of year - learn to date
Review - Days of week

Lesson XVII

arithmetic	minute	hundred	quarter	quart
peck	bushel	coin	purchase	answer
equal	divide	ounce	column	number
group	consonant	alphabet		

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Lesson XVIII

April	March	front	opposite	frozen
June	February	birth	birthday	forget
July	January	airplane	photograph	business
every	afraid	angry	hungry	

Lesson XIX

direction	correction	definition	question	population
abbreviation	dictionary	television	protection	fiction
forget	popcorn	talk	color	except
				hold

Lesson XX

remain	telephone	forward	yesterday	precede
together	picture	camera	their	office
street	listen	person	circus	wrote
chance	roof	surprise	practice	

APPENDIX P

170 EXTRA-HARD WORDS FOR GRADE FOUR SPELLERS

knocked	husband	fields	holiday	sweater
polar	giant	forgotten	traveling	lovingly
noticed	American	Negro	hurried	piano
elected	remembered	population	moss	one's
public	garage	subject	cousins	promised
cabbage	gotten	dropped	sentence	couple
there's	slippers	grandmothers	exciting	journey
violin	pupil	canary	eighth	treasure
question	conquest	divided	recess	choose
famous	mother's	beginning	cellar	balloon
quietly	daughter	common	studies	safety
acres	distance	castle	surface	junior
costumes	grocery	planning	modern	holidays
addition	receive	general	reindeer	central
national	climate	themselves	flies	products
tobacco	subjects	dangerous	slaves	germs
squirrels	neighbors	bananas	decorated	rifle
neighbor	you're	studied	allowed	neither
slipped	practice	valentines	possible	secret
million	certain	canoe	handkerchief	pleasant
February	honor	autumn	region	sentences
automobile	believed	pilgrims	industry	lettuce
furniture	period	whistle	buried	whether
easily	planned	science	aunt's	stepped
speech	accident	capital	special	factories
auntie	fairies	colonies	separate	attention
carnival	museum	prettiest	skies	system
shepherds	scene	material	citizens	typewriter
celebrate	grabbed	college	skiing	handkerchiefs
manufacturing	citizen	terrible	probably	stomach
electricity	position	imagine	secretary	assembly
certainly	articles	characters	constitution	disease
operetta	experience	orchestra	necessary	auditorium
principal	appreciate	especially	foreign	association

APPENDIX Q

MATERIAL RECEIVED BY ALL SCHOOLS

SPELLING

Grades Four, Five, and Six

I. General principles to follow in teaching spelling

A. The most justifiable criterion for the selection of words for spelling instruction is their use in writing.

B. Words used in their functional writing have meaning for children.

C. The importance of relating spelling to meaningful writing does not diminish when more systematic instruction is undertaken.

D. For most groups of children, expecially intermediate, the test-study-test plan of instruction proves best.

E. What is done in the period of study is, of course, most important. Study that involves the sound, appearance, meaning, and use of words is necessary.

F. It is as logical to group children for learning to spell as it is for learning to read because spelling abilities are so clearly distinguishable. The class as a whole deals only with matters of common concern.

G. Understanding syllabication helps children see the parts of words. This aids in pronouncing and remembering words. Children should learn to recognize syllables as parts of entire words rather than as separate elements.

H. The spelling list being used must be within the learner's ability to master.

I. Build a "spelling conscience".

J. Require correct spelling in a finished product.

K. Whenever possible correct errors as the child works rather than after a period of time.

L. Proofreading is essential.

M. The middle-grade child develops the tools he needs in perfecting spelling skills such as a basic method for learning to spell each individual word (spelling power), plus the dictionary skills that will aid him in checking for correctness. At this stage the teacher gives a considerable amount of guidance.

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N. A folder that contains evidence of the amount of progress is advantageous. Such evidence includes first drafts and finished pieces of writing related to school activities, separate lists of words that he can spell without any help, others on which he is working, and still others that interest him to such an extent that he would like to make them part of his spelling vocabulary.

O. Research shows that it is the easy words the intermediate grade pupils misspell -- the three kinds of there and the three kinds of to.

P. Careless and poor handwriting are the most frequent causes of mistakes in spelling.

II. Word attack or study techniques for learning to spell a new word (James Fitzgerald)

A. Approach
   1. Pronunciation
   2. Meaning
   3. Use

B. Active learning of spelling
   1. Imagery through visual scrutiny
   2. Recall
   3. Writing the word
   4. Mastery of the spelling of the word

C. Use of the word

III. Guide questions for evaluation (Ethel Hatchell and Donald Hughes)

A. Does the child spell commonly used words correctly in his written work?

B. Does he keep a list of words he misspells?

C. Can he study independently?

D. Can he apply simple generalizations?

E. Does he use the dictionary frequently?

IV. Spelling rules

A. Rules should always be developed inductively.
After a rule has been developed it needs to be reviewed and applied regularly.

B. Only rules which apply to a large number of cases and have few exceptions need to be taught.

C. Teach those rules given in the teacher's edition of the spelling textbook.

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V. Development of independence or self-dependence

A. Have the child keep a list of his own misspelled words and learn to spell those words -- a composite record of all Friday's tests will show progress. Pairs of children may work together once a week to check each other on these individual lists.

B. Form the habit of consulting a dictionary for correct spelling.

C. Help a child to diagnose his own needs.

D. Teach understanding of derived forms.

E. Build for "spelling conscience" -- word mastery requires continued use and practice.

VI. Interest in spelling

A. Have varied, spirited, expeditions work in the spelling period.

B. Lead pupils to appreciate the fact that spelling errors make a poor impression in letters and other written work.

C. Satisfy the need to achieve through definite evidence that each child is making progress. Let children cooperate in setting their goals.

D. Dr. Ernest Horn says "Mutual helpfulness is better than competition. Games, contests, devices, and working for school marks, if used at all, should be thought of as supplementing the more intrinsic appeals listed above rather than as substituting for them".

E. Give the pre-test -- Have each child check his own making corrections carefully -- Without further study, pronounce list again -- Let child see improvement he made through careful correction.

F. Dramatize or act out words to be spelled.

G. Games help create interest in spelling -- Here are a few you may wish to use:

1. Racing Game--
   One child writes a word on the blackboard beginning with a silent letter, as knife. Other children then see how many words they can write beginning with the same silent letter, as know, knot, knead, knight, etc.

2. Word Pyramid --
   Start at the top of the pyramid with the word a. The players take turns adding another letter to form a new and longer word and to build the

pyramid. If the first player adds t, the pyramid may develop as follows: a, at, eat, meat, or team, steam, stream. Plurals do not count. For example, adding s to meat is wrong, but using "s" to form the new word steam is right. The pyramid may be built on the blackboard or on the table with alphabet blocks.

3. Puzzles--
   Block out a puzzle, placing the initial letter of desired words at the top of the vertical columns. A list of meanings provides added clues. No attempt need be made to build words horizontally. One can build words horizontally and not vertically.

4. Word Authors--
   This game is played like the old game of "Authors". A "book" is completed when a child holds four variations of a word, as: walk, walks, walked, walking. Whoever holds most "books" is the winner. Prefixes can be used as well as suffixes.

5. Word Hunt--
   Have children see how many short words they can find and write in a given length of time from a long word appearing on the blackboard. Credit is given for only correctly spelled words.

6. Baseball Games--
   Let two captains choose sides, making sure that all children are on a team. Pronounce three words, one at a time, for the first "batter" to spell. If he spells all three words correctly, he takes his position in a corner of the room designated as "first base." Second batter is then up and the same procedure followed. First batter steps to second base, present batter to first base. The same proceeds until all bases are filled, etc. Words could be written on board rather than spelled orally.

7. Treasure Box--
   Words are written on separate slips of paper which are then folded and put into a box called the "treasure box." Each child in turn draws out a slip and hands it to the teacher without opening it. The teacher pronounces the word for the child to spell. If he misspells the word, the slip is returned to him. Whoever ends with no slips is winner.

8. Vowel and Consonant Games
   a. Have pupils write sentences in which the initial consonant in every word is the same. Betty buys big blue balloons.
   b. Direct pupils to make new words by changing the vowel in such a word But to make the words, bat, bet, and bit.

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c. Divide the class into two groups. Have one group make new words by prefixing a consonant, such as prefixing b, c, f, etc., to all, and the other group make new words by subtracting initial consonants from words such as year and train to make ear and rain.
d. Introduce a puzzle element, by saying:
"I am in Toy, Top and Tree. What sound am I?"
"I am in Took, but I am not in Look."
Look, like, and little begin with me.
Stand, friend, and good all end with me.

9. Endless Chain--
A player starts this game by spelling any word that he wishes. The next player spells a word that begins with the first letter of the word spelled by the first player.

The Improvement of Spelling
Madison Public Schools
Curriculum Department
Madison, Wisconsin

10. A Word Game--
All the players form a circle and a large rubber ball is tossed around the circle. Each person receiving the ball must call out a word ending with a given sound.

11. Have child give a sentence containing a word from a given list but not say the given word. The class determines the word from context and writes it.

H. Exercises which will give additional practice in spelling:
1. Writing a story (original) using as many of the day's words as they can
2. Making up riddles about some of the day's words
3. Using some of the day's words to write jingles
4. Working with some of the slow spellers on the day's words
5. Working out charades to illustrate one of the day's words
6. Making a picture dictionary for slow learners
7. Working together in groups of two to see how accurately they can spell words which they hear but do not see
8. Making a list of as many rhyming words as possible for each word in the day's work, as:

hurry	since	September
flurry	mince	November
scurry	convince	December
furry		remember

9. Keeping a list of new words they see or hear used in life outside the classroom

---Research Department Report, Webster Publishing Co.

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VII. Factors which are most frequently associated with low achievement:

A. Low reading ability
B. Defective speech
C. Slow or illegible handwriting
D. Disabling traits of personality
E. Low intelligence
F. "Many children are poor spellers because of one or more of the following: (1) They are not interested in spelling. (2) The right words have not been presented to them. (3) Time has been wasted by them in studying words they did not need or words they already knew how to spell. (4) A well-planned spelling program has not been inaugurated. If a child studies the words he cannot spell when he needs them in his writing, by a method which provides efficient ways of learning and which informs him of success when he has mastered a word, he will most generally succeed in learning to spell."

--James A. Fitzgerald, Professor of Education at Fordham University, Child and the Language Arts

VIII. The one hundred most frequently misspelled words in grades 2-6:

all right	fine	January	pretty	that's
were	am	for	know	received
the	and	when	friend	letter
right	their	will	are	from
like	Santa Claus	them	with	because
getting	likes	Saturday	then	won't
birthday	goes	me	school	there
would	Christmas	going	morning	some
they	write	coming	good-by	mother
sometime	time	writing	cousin	guess
Mrs.	sometimes	to	you	didn't
Halloween	my	stationery	today	your
don't	have	name	summer	tonight
down	haven't	now	Sunday	too
every	he	o'clock	suppose	two
everybody	here	October	sure	very
February	him	on	swimming	want
I'm	how	one	teacher	was
it	I	our	teacher's	we
it's	I'll	play	Thanksgiving	went

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MATERIALS RECEIVED BY ALL SCHOOLS

THE MASTER DEMON LIST OF 222 WORDS
A Useful Core Vocabulary For Child Writing

James A. Fitzgerald, "A Crucial Core Vocabulary in Elementary School Language and Spelling." American School Board Journal, Vol. 103, July, 1941, pp. 22-24

about	dog	how's	party	then
address	don't	I	people	there
afternoon	down	I'll	play	there's
again	Easter	I'm	played	they
all right	every	in	plays	they're
along	everybody	isn't	please	think
already	father	it	pretty	thought
always	Feb.	it's	quit	through
an	fine	I've	quite	time
an	first	Jan.	receive	to
and	football	just	received	today
answer	for	know	remember	together
anything	fourth	lessons	right	tomorrow
anyway	Friday	letter	said	tonight
April	friend	like	Santa Claus	too
are	friends	likes	Saturday	toys
arithmetic	from	little	saw	train
aunt	fun	lots	school	truly
awhile	getting	loving	schoolhouse	two
baby	goes	made	send	until
balloon	going	make	sent	vacation
basketball	good	Mar.	sincerely	very
because	good-by	maybe	snow	want
been	got	me	snowman	was
before	grade	Miss	some	we
birthday	guest	morning	something	weather
bought	had	mother	sometime	well
boy	Halloween	Mr.	sometimes	went
boys	handkerchiefs	Mrs.	soon	were
brother	has	much	stationery	we're
brought	have	my	store	when
can	haven't	name	studying	white
cannot	having	nice	summer	will
can't	he	Nov.	Sunday	with
children	hear	now	suppose	won't
Christmas	hello	nowadays	sure	would

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close	her	o'clock	surely	write
come	here	Oct.	swimming	writing
coming	him	off	teacher	you
couldn't	his	on	teacher's	your
cousin	home	once	Thanksgiving	you're
daddy	hope	one	that's	yours
day	hospital	our	the	
Dec.	house	out	their	
didn't	how	outside	them	

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A CORE VOCABULARY OF SPELLING WORDS

By George Kyte and Virginia Neel

Elementary School Journal, 54:32-33, September, 1953

Type I. 315 Words Occurring In Identical Form Among 500 Most Commonly Used Words In Adults' and In Children's Writing.

a	call	from	kind	now
about	called	full	knew	of
after	came	gave	know	off
afternoon	can	get	large	old
again	can't	getting	last	on
ago	car	girl	later	once
all	care	give	left	one
almost	city	glad	let	only
along	class	go	letter	open
also	close	going	life	or
always	cold	gone	like	other
am	come	good	little	our
an	coming	got	long	out
and	could	great	look	over
another	country	guess	looking	paper
answer	cut	had	lot	part
any	day	half	love	party
anything	days	hand	made	people
are	dear	happy	make	place
around	did	hard	making	play
as	didn't	has	man	please
ask	different	have	many	pretty
asked	dinner	having	may	put
at	do	he	me	quite
away	does	hear	men	read
back	doing	heard	might	ready
bad	done	help	money	received
be	don't	her	more	rest
because	down	here	morning	right
bed	each	high	most	room
been	early	him	mother	run
before	end	his	Mr.	said
being	enough	home	Mrs.	same
best	ever	hope	much	Saturday
better	every	house	must	saw
big	far	how	my	say
book	few	I	name	school
books	find	if	near	second
both	fine	in	never	see
box	first	into	new	send
boy	five	is	next	sent

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bring	for	it	nice	set
but	found	its	night	she
buy	four	just	no	should
by	friend	keep	not	show
since	two	six	under	small
until	so	up	some	upon
something	us	soon	use	sorry
used	stay	very	still	want
such	wanted	summer	war	Sunday
was	sure	way	take	we
tell	week	ten	weeks	than
well	thank	went	that	were
the	what	their	when	them
where	then	which	there	while
these	who	they	why	thing
will	things	winter	think	wish
this	with	those	work	thought
world	three	would	through	write
time	writing	to	wrote	today
year	together	years	told	yes
too	yesterday	took	yet	town
you	truly	your	try	yours

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Leslie W. Johnson, "One Hundred Words Most Often Misspelled By Children In The Elementary Grades." Journal Of Educational Research 44:154-5, October, 1950 (Study of creative writings of 14,643 children)

their	running	wanted	before	too
believe	hear	caught	there	little
from	every	they	things	frightened
different	then	him	for	interesting
until	it's	February	swimming	our
started	once	first	asked	that's
like	were	off	would	they're
than	through	again	cousin	two
mother	heard	something	know	another
received	named	decided	threw	coming
came	friend	some	to	name
when	bought	said	tried	let's
getting	because	here	sometimes	going
thought	many	friends	course	and
knew	children	woman	beautiful	with
an	animals	it's	all right	school
you're	went	together	jumped	clothes
where	happened	around	looked	stopped
didn't	dropped	people	very	always
babies	pretty	morning	surprise	money

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First 100 Words In Order of Frequency

from

A Basic Writing Vocabulary - 10,000 Words Most Commonly Used in Writing

I	our	yours	the	from
now	and	am	well	to
one	an	a	time	here
you	he	them	of	get
see	in	do	go	we
been	what	for	letter	come
it	can	were	that	would
no	is	she	how	your
when	did	have	about	think
will	they	say	be	any
please	are	which	him	not
some	his	as	has	got
at	or	over	this	there
make	with	us	may	but
good	received	on	know	before
if	just	two	all	by
send	so	up	after	me
day	work	was	much	could
very	out	dear	my	her
made	had	order	glad	like

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150 EXTRA-HARD WORDS FOR GRADE THREE SPELLERS

program	women	thousand	pencil	tomorrow
surprised	office	scared	different	death
kitchen	telephone	build	instead	threw
building	heavy	bridge	chicken	enough
beautiful	colored	discovered	though	months
electric	either	lessons	truly	mountain
hungry	surprise	business	history	answered
station	health	happened	teacher's	beads
interesting	suppose	board	company	doesn't
awhile	Halloween	southern	climbed	listen
important	we'll	colors	president	thirty
fifth	written	skating	circus	decided
passed	elephant	believe	flew	village
we're	running	all right	ghost	let's
quickly	against	grown	remember	library
fourth	carried	supposed	field	studying
minute	enjoyed	surely	awful	doctor
parents	minutes	desert	language	straight
stockings	known	cities	sliding	chief
squirrel	radio	hadn't	suddenly	pupils
trouble	countries	oranges	sudden	geography
laughing	babies	hospital	that's	finished
several	piece	laughed	course	interested
post office	education	Indian	valentine	soldiers
excuse	potatoes	favorite	else	married
frightened	answer	settled	finally	breakfast
wouldn't	vegetables	whole	fought	arrived
travel	really	sincerely	sugar	toward
sleigh	stories	policeman	usually	raise
taught	bicycle	buildings	pieces	government

The above list from American English Book 3 by Burrows, Stauffer and Jackson.

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170 EXTRA-HARD WORDS FOR GRADE FOUR SPELLERS

knocked	quietly	February	electricity	husband
daughter	honor	position	fields	common
autumn	imagine	holiday	studies	region
secretary	sweater	safety	sentences	assembly
polar	acres	automobile	certainly	giant
distance	believed	articles	forgotten	castle
pilgrims	characters	traveling	surface	industry
constitution	lovingly	junior	lettuce	disease
noticed	costumes	furniture	operetta	modern
American	grocery	period	experience	buried
Negro	planning	whistle	orchestra	necessary
hurried	piano	holidays	whether	auditorium
elected	addition	easily	principal	remembered
receive	planned	appreciate	population	general
science	especially	moss	reindeer	aunt's
foreign	one's	central	stepped	association
public	national	speech	garage	climate
accident	subject	themselves	capital	cousins
flies	special	promised	products	factories
cabbage	tobacco	auntie	gotten	subjects
fairies	dropped	dangerous	colonies	sentence
slaves	separate	couple	germs	attention
there's	squirrels	carnival	slippers	neighbors
museum	grandmothers	bananas	prettiest	exciting
decorated	skies	journey	rifle	system
violin	neighbor	shepherds	pupil	you're
scene	canary	studied	material	eighth
allowed	citizens	treasure	neighbor	typewriter
question	slipped	celebrate	conquest	practice
grabbed	divided	valentines	college	recess
possible	skiing	choose	secret	handkerchiefs
famous	million	manufacturing	mother's	certain
citizen	beginning	canoe	terrible	cellar
handkerchief	probably	ballon	pleasant	stomach

The above list from the American English Book 4, by Burrows, Stauffer and Jackson.

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200 EXTRA-HARD WORDS FOR GRADE FIVE SPELLERS

aisles	league	mirror	unknown	immediately
families	cabinet	trimmed	hygiene	medicine
attended	naughty	principle	impossible	transportation
cruel	religious	permission	amusement	example
character	boundary	independence	colony	grammar
pigeon	happiness	pardon	successful	carriage
length	pitcher	agriculture	Negroes	lawyer
umbrella	disappointed	anxious	purpose	discovery
gymnasium	magazines	separated	listened	ancient
chocolate	machinery	princess	extremely	excitement
district	salmon	stationery	awfully	memory
search	quantities	accidents	gym	exclaimed
cafeteria	vegetable	practicing	pickles	disappeared
paragraph	spirits	Christ	temperature	mineral
skinned	lightning	examination	odor	calves
difference	intelligent	civil	envelope	roaster
generally	religion	wreck	crowded	occupation
excellent	cranberries	listening	scenery	spirit
tennis	musical	various	liquid	nephew
throne	territory	materials	icy	meant
committee	vice-president	satisfied	multiply	scissors
occupied	deposits	per cent	graduated	considered
happily	roller skates	expense	decorations	project
weighed	examinations	height	energy	adopted
commerce	salute	cocoon	grandpa's	groceries
suggested	magazine	independent	pigeons	surrounded
alfalfa	angel	military	Capitol	niece
touched	enemies	ache	rapidly	smallpox
fierce	comfortable	wrap	prepared	valuable
equipment	drowned	breathe	phrase	engineer
century	further	council	continent	poison
merry-go-round	community	exercise	pier	grandma's
criminal	developed	confederation	blooming	success
appeared	usual	happiest	invitation	easier
children's	men's	diamond	method	argument
twenty-five	natural	social	pirates	harness
succeeded	continued	haunted	towards	calendar
author	sandwiches	blossoms	governor	girls'
scratch	stoop	established	they're	escaped
sister's	kindergarten	process	wealthy	dining

The above list from American English Book 5 by Burrows, Stauffer and Ferebee.

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SPELLING GAMES AND MNEMONIC DEVICES

From Resource Materials for Teachers of Spelling by Paul S. Anderson

Games provide extra motivation for some of the drill children need to master the spelling of our language. While it is unlikely that spelling will ever have the fascination of baseball for some children, or golf for some adults, interest in words and their spelling can be heightened by using a game involving spelling. The daily crossword puzzles of the newspapers is an example.

GAMES FOR PRIMARY GRADES

1. PUZZLE ELEMENTS.

   a. I am in sled, sleep, and slip. What sound am I?
   b. I am in took, but I am not in look. I am _____.
   c. Baby, book, ball. The b is at the _____.

2. MAKING NEW WORDS BY CHANGING THE VOWEL.

bat	bet	bit	but	cat
cot	cut	bug	big	beg
for	fur	far	ham	hum
him	pen	pan	pin	pot
pat	pit			

3. MAKE ALL THE WORDS YOU CAN BY ADDING LETTERS TO THESE COMMON ENDINGS. (The old word family idea.)

all	--	call	bail	tall	fall	hall	stall	wall
and	--	sand	band	hand	land			
old	--	cold	bold	fold	gold	hold		
an	--	fan	can	man	pan	ran		
in	--	tin	bin	fin	pin			
ike	--	bike	dike	like	hike	mike		
ate	--	bate	crate	date	fate	gate		
ill	--	bill	dill	fill	hill	pill		

4. TREASURE BOX.

Words are written on separate slips of paper which are then folded and put into a box called the treasure box. Each child in turn draws out a slip which he hands to the teacher without opening it. The teacher pronounces the word and the child attempts to spell it. Any misspelled words are handed back to the children who had difficulty with them. The object is for the pupil to end the game with no slips of paper. Those who do have slips learn to spell the words that are on them. Two children can thus provide extra practice for each other as they play this game in the quiet corner.

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5. FIND IT.

Words are listed on the blackboard. The teacher or a student gives the definition of the word and the children in turn write the word defined.

6. HEAR IT.

The words are listed on the board. The leader says, "I am thinking of a word that starts with the same sound as one hears at the beginning of _____," or "one rhymes with _____." The children write the words indicated and gain a point for their own score for each correct selection.

7. NOVELTY SPELLING.

Instead of calling words from a spelling list, the teachers asks such questions as "Spell a word that rhymes with joint." "Write a word containing ph which sounds like f." "Write a word that means _____." Have the class in turn read their lists. The variety adds interest as well as influencing vocabulary.

8. RING THE BELL.

This is to get practice during those moments while waiting for the bell to ring at recess or noon. The teacher pronounces words while the group waits for the bell to ring. The one spelling at the time the bell does ring is the "Bell Ringer". This is effective when misspelled words, used during the day, are listed on the board and used in the drill.

9. BLACKBOARD SPELLING.

Primary children feel it is a privilege to write on the blackboard. Reserve a place at the board where a child may go during his free time just as he might go to the library corner. Each put a different exercise on the board, such as:

What children in our room have names that start with B?
What do you want for Christmas?
What do you like to eat?
Where would you like to visit?
How many words do you know that start with wh?

10. WORD GROUPS.

Children make a collection of words about a topic or interest. One may collect "Christmas Words," another "House Words," "Sport Words," etc. These may be made into simple picture dictionaries or charts.

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11. PICTURE WORDS.

This is similar to the above except that the student starts with a picture and then lists all the words he knows that might be found in the picture or writing about it.

12. WORDS WE USE.

Have each child select two words from his social studies lesson that he thinks the class should be able to spell. Put the words on the chalkboard. Then have a class discussion on which ones seem most important and which few (no more than ten) they should concentrate on. Have each child copy the master list and study it. Devote the last few minutes of the social studies class to testing on these words. Example: street, store, milkman, post office, mail, truck, railroad.

13. BASEBALL.

Players are pitcher, catcher, and batters. Pitcher tosses a word to a batter. If he spells it correctly, he goes to first base and next batter comes up. If he misses, the catcher spells the word. If correct, the word is a caught pop fly. Batter then becomes the pitcher, pitcher the catcher, and catcher a batter.

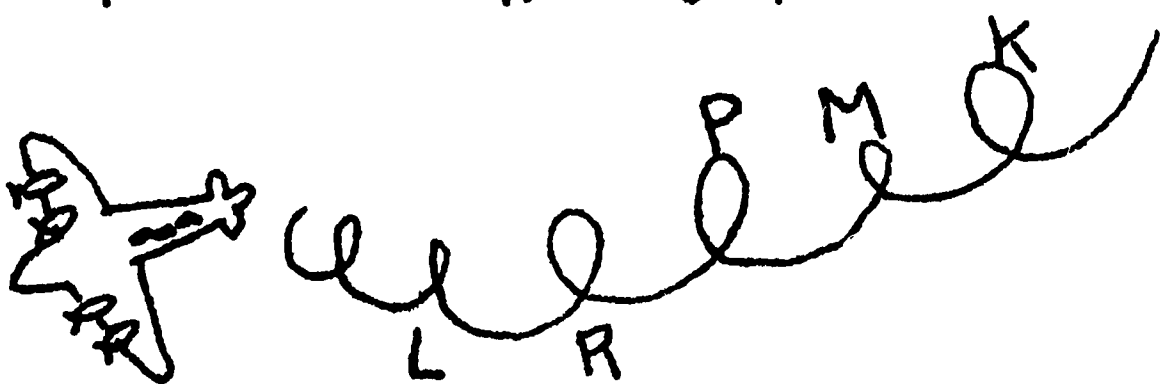
If the catcher misses the word, the batter is given a ball (another turn). With two balls, he goes to first base. Batters move from base to base only when other batters force them on. The child with the most runs wins.

14. PUT WORDS TOGETHER.

From time to time have children make cutout letters of the alphabet with several small letters and several capitals of each. Put all the letters in a box. When someone has free time, or during his choosing time, he may go to the table, take out the letters, and form various words. The words may be dictated by the teacher, they may be his name and address, food he likes, games he likes to play, the names of his friends, and so on. The possibilities are endless and the teacher can check them at a glance.

15. LOOP THE LOOP.

Draw the accompanying diagram on the board. Use letters of words from their spelling lesson. One child at a time is the pilot, who tries to loop the loop perfectly. If he can spell each word correctly, he is a good pilot.



16. MIDGET AUTO RACE.

Draw a picture representing a race track with letters and a midget racing car. Use the letters of words from their spelling lesson on the track. Each child takes turn racing around this track by correctly spelling the word that the letter starts with. Have a timekeeper and time each racer. The child who spells the words in the shortest time wins the race.

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SPELLING GAMES FOR UPPER GRADES

1. BASEBALL

A game especially good for practice on words frequently misspelled. Each card contains a word, a value such as one base hit, home run, etc., and the name of the position who is to catch the ball if it is misspelled. The cards would be like this:

all right	separate	February
2-base hit	home run	3-base hit
3rd baseman	pitcher	right field

Sometimes children take positions in the classroom as if it were a baseball diamond. It is equally interesting to use a blackboard diagram with players remaining at their seats while the team captain indicates their movements on the diagram.

2. ROOTS AND BRANCHES.

This game is intended to develop awareness of parts of words, particularly grades 2 to 6. Make four cards for each of several root words--for example, <u>march</u>, <u>marched</u>, <u>marching</u>, <u>marcher</u>; <u>fear</u>, <u>feared</u>, <u>fearing</u>, <u>fearful</u>, etc.

Make enough copies of each set of words for four "books." Shuffle the cards and deal six cards at a time to each player. Players sort their cards as in playing "Authors". If a player holds four cards of words from the same root, he can make a "book". Each player in turn may call for a card by naming the card he holds and may continue to call as long as other players hold wanted cards. When there are no more available cards of the kind he calls, he discards, and the next player takes his turn. The objective is to get as many books as possible. Care should be taken in preparing the cards for this game not to introduce different elements too fast for retarded readers; for example, doubling the final consonant of a root, or changing the sound, as <u>lose</u> and <u>lost</u>, etc.

3. SPELLING JINGLES.

When the children come across a new word, they can help establish its spelling in their minds by writing jingles using the word in rhyme. The children enjoy composing the jingles and, at the same time, learn to spell the new word and other similar words. When the word "night" was learned, for example, the following was written:

When it is night
We need a light.

4. WHAT'S MY WORD?

Each child has a different word. One stands in front of the group. Each student in

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turn may ask one question, then spell the word he thinks is the word of the one in front. The questions may concern the meaning, the beginning sound, a rhyming word, or the word root. The student who identifies the word takes the leader's position.

5. SMOKED BACON.

Make two or more sets of cardboard letters with the letters SMOKED BACON. Teams face each other with each child holding one letter. One teacher calls out a word which can be spelled by these letters. First team to get in correct positions gets a point. These letters form, at least a hundred words.

This can be a blackboard game. Write SMOKED BACON on the board. Let each team write a word in turn. The winner is the one who writes the longest list of words in a certain time limit. As a flannel board game, this may be a group of individual activity.

A list of 87 possible words to make from the words--SMOKED BACON-- accompanied with a flannel board:

Words used by 50% or more of the 2nd and 3rd grade children:		Words used by less than 50% of the 2nd and 3rd grade children:		Other Words
see	come	desk	base	doe
an	some	naked	case	soak
am	bake	son	sake	moan
as	make	dam	smoke	sac
no	snake	mood	canoe	nab
do	cake	dance	cane	cab
so	bad	den	sane	dab
does	mad	sab	soda	snack
made	sad	mob	mean	cob
bed	can	nod	bean	sod
came	man	sock	bone	dock
men	book	mack	cone	moose
done	cook	code	sack	noose
back	moon			ace
name	soon			coke
same	sand			dean
dad	band			smack
				cad
				ban

6. SAVE YOUR PARTNERS.

Students are divided into groups of three. Several categories are put on the

APPENDIX Q

board or one may be enough. The teacher names a letter such as "b". If the category were cities, number one of the trio must think of a city beginning with "b". Then, number two must spell it in writing. Number three may save either partner. If number one cannot think of a city, number three may name one. If number two cannot spell the city names, number three has a chance to save him by spelling it correctly. Each trio competes with another. If number three cannot save either number one or two, that trio loses and may take their seats, or a score might be kept between competing groups.

7. YOU CAN'T CATCH ME.

As the teacher gives the first word, each child writes it on his paper. Then the papers are passed in a predetermined order (to left, etc.). The child receiving the paper checks the last word and writes the word correctly if necessary. Then the teacher gives the second word and the papers are passed. Every paper should be perfect if all errors are caught. While this may not always happen, those words needing review will have received attention in a different way.

8. SPELLING TIC-TAC-TOE.

Two individuals compete, each in turn. No one writes in a word on crossbars of the tit-tat-toe game. The object is to write three words in line or diagonally which contain a common element. This may be beginning, ending, prefix, word root, etc. The first player has written "bring" in a square. The second player writes "happy" in the middle square. The first player now writes "string" in a square. The second player writes "sleepy" in a square. The first one writes "spring", the second puts in "lumpy". The first player then puts in "ring" (or any "ing" word) and wins.

bring		sleepy
ring	happy	
spring	lumpy	string

APPENDIX R

TABLE XXIV

STANDARD DEVIATIONS

HOW I LIKE SCHOOL INVENTORY

GRADE		Lincoln		Emerson		Cleveland	
		1	2	1	2	1	2
3	1	6.91	4.68	6.19	8.33	3.55	3.13
	2	6.05	6.96	5.37	5.56	3.28	3.71
	3	5.77	4.83	7.04	7.97	4.74	8.82
	Total	6.39	5.57	6.41	7.53	3.97	6.05
4	1	3.59	3.66	8.72	5.05	3.45	5.03
	2	5.02	5.67	5.00	4.30	5.02	6.22
	3	5.36	7.11	5.56	5.88	7.53	7.25
	Total	4.88	5.97	6.21	6.62	5.67	6.52
3 & 4	1	5.58	4.19	7.85	8.43	3.53	4.28
	2	5.53	6.45	5.84	5.26	4.55	5.28
	3	5.89	6.35	7.05	7.51	6.46	8.00
	Total	5.78	5.89	6.65	7.59	5.05	6.31

NATIONAL ACHIEVEMENT TESTS IN SPELLING

GRADE		Lincoln		Emerson		Cleveland	
		1	2	1	2	1	2
3	1	11.53	9.03	10.27	8.76	10.26	10.13
	2	9.02	11.69	8.24	10.70	11.93	12.04
	3	9.23	12.58	11.99	15.05	10.46	11.91
	Total	10.34	11.44	10.62	12.69	11.21	11.62
4	1	6.04	3.34	6.00	3.31	5.68	2.96
	2	9.53	8.54	7.32	4.59	8.55	4.41
	3	11.83	10.73	6.57	6.09	9.32	8.26
	Total	12.97	10.46	10.37	7.31	10.88	7.49
3 & 4	1	13.53	8.22	11.81	8.24	10.60	10.24
	2	9.54	11.14	10.42	9.23	12.53	11.38
	3	10.74	11.75	9.56	11.71	10.01	10.96
	Total	12.68	11.01	10.84	11.08	12.21	11.46

(Column 1 = Pre Test; 2 = Post Test)

APPENDIX R

TABLE XXIV

TEST ON WORD LIST FROM PROGRAMMED SPELLING COURSE

GRADE		Lincoln		Emerson		Cleveland	
		1	2	1	2	1	2
3	1	9.12	6.48	7.38	7.94	8.68	8.30
	2	8.27	8.22	7.31	9.02	8.08	9.89
	3	8.67	8.78	8.91	12.56	8.25	8.99
	Total	8.91	8.11	6.53	10.86	8.66	9.29
4	1	4.10	2.58	4.73	1.69	4.92	1.68
	2	6.21	4.95	5.41	2.68	5.18	3.28
	3	8.49	6.69	5.81	3.07	6.54	5.28
	Total	8.60	6.97	7.74	3.72	7.44	4.97
3 & 4	1	9.51	5.34	8.81	6.52	9.18	8.00
	2	7.56	6.69	8.15	6.98	8.95	9.13
	3	8.81	8.00	7.48	9.89	8.19	8.27
	Total	9.45	7.56	8.96	8.60	9.55	8.89

TEST ON RULES OF SPELLING

GRADE		Lincoln		Emerson		Cleveland	
		1	2	1	2	1	2
3	1	8.87	6.87	7.38	7.63	9.83	9.84
	2	11.19	7.95	7.14	7.54	10.62	8.44
	3	9.69	12.56	12.70	17.04	9.39	8.64
	Total	10.40	9.90	10.08	13.49	10.72	9.66
4	1	7.59	3.97	5.46	2.50	6.13	3.88
	2	10.65	8.74	5.88	5.41	8.78	8.18
	3	10.14	8.36	8.63	5.42	8.48	9.20
	Total	11.27	9.64	9.34	6.16	10.34	9.49
3 & 4	1	9.25	5.72	9.07	6.99	9.97	9.63
	2	10.93	9.38	7.68	6.97	10.80	9.61
	3	9.93	11.27	10.99	13.99	9.30	9.59
	Total	11.02	9.96	10.64	11.12	11.47	10.77

(Column 1 = Pre Test; 2 = Post Test)

APPENDIX R

TABLE XXIV

TEST ON WORD LIST TO MEASURE TRANSFER OF SPELLING SKILLS

GRADE		Lincoln		Emerson		Cleveland	
		1	2	1	2	1	2
3	1	9.74	8.52	6.44	7.50	8.32	8.25
	2	7.74	6.89	5.58	8.45	8.77	10.82
	3	12.18	9.19	9.39	11.99	7.93	9.68
	Total	8.81	8.69	7.60	10.13	8.69	9.83
4	1	5.00	1.98			5.37	3.19
	2	5.72	6.34			6.93	3.22
	3	7.41	9.19			6.16	5.20
	Total	7.18	7.94			8.12	5.04
3 & 4	1	10.98	7.19			8.60	7.83
	2	6.85	6.65			10.10	9.73
	3	7.86	9.25			7.37	8.34
	Total	9.52	8.40			9.57	9.00

(Column 1 = Pre Test; 2 = Post Test)

APPENDIX S

TABLE XXV

MEAN SCORES ON THE LORGE-THORNDIKE INTELLIGENCE TEST
BY SCHOOL, GRADE, AND ABILITY GROUP

GRADE		N	Lincoln	N	Emerson	N	Cleveland	N	TOTAL
3	1	18	126.00	16	127.31	19	125.16	53	126.09
	2	17	116.41	15	116.73	19	113.84	51	115.55
	3	18	101.33	15	104.80	19	102.95	52	102.92
	Total	53	114.55	46	116.52	57	113.98	156	114.92
4	1	18	120.06	19	126.11	22	120.95	59	122.34
	2	18	109.00	19	113.42	22	110.91	59	111.14
	3	17	95.00	20	101.00	22	101.50	59	99.37
	Total	53	108.26	58	113.29	66	111.12	177	110.98
3 & 4	1	36	123.03	35	126.66	41	122.90	112	124.17
	2	35	112.60	34	114.88	41	112.27	110	113.18
	3	35	98.26	35	102.63	41	102.17	111	101.08
	Total	106	111.41	104	114.72	123	111.54	333	112.83